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ANNUAL REPORT OF THE

SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE OF THE UNITED STATES

FOR THE FISCAL YEAR

1916

WASHINGTON
GOVERNMENT PRINTING OFFICE
1916

TREASURY DEPARTMENT,
Document No. 2792.
Public Health Service.

LETTER OF TRANSMITTAL.

Treasury Department,
Office of the Secretary,
Washington, December 4, 1916.

Sir: In accordance with section 9 of the act of Congress approved July 1, 1902, "An act to increase the efficiency and change the name of the Marine-Hospital Service," I have the honor to transmit herewith the report of the Surgeon General of the Public Health Service for the fiscal year 1916.

Respectfully,
W. G. McAdoo,
Secretary.

The Speaker of the House of Representatives.

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OPERATIONS OF THE UNITED STATES PUBLIC HEALTH SERVICE.

1916.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE.

Treasury Department,
Bureau of the Public Health Service,
Washington, D. C., October 5, 1916.

Sir: In accordance with the act of July 1, 1902, I have the honor to submit for transmission to Congress the following report of the operations of the Public Health Service for the fiscal year ending June 30, 1916. This is the forty-fifth annual report of the service, and covers the one hundred and eighteenth year of its existence.

As heretofore, the administrative work of the bureau has been conducted through seven divisions, in accordance with the organization provided by the act of July 1, 1902. In the following report the operations of the service have been set forth under the titles of the respective bureau divisions in the following order:

(1) Scientific research.
(2) Foreign and insular quarantine and immigration (maritime quarantine).
(3) Domestic (interstate) quarantine.
(4) Sanitary reports and statistics.
(5) Marine hospitals and relief.
(6) Personnel and accounts.
(7) Miscellaneous.

The administrative personnel of the bureau during the year has consisted of the following:

Surg. Gen. Rupert Blue.

Asst. Surg. Gen. A. H. Glennan, in charge of Division of Personnel and Accounts.

Asst. Surg. Gen. W. G. Stimpson, in charge of Division of Marine Hospitals and Relief.

Asst. Surg. Gen. L. E. Cofer, in charge of Division of Foreign and Insular Quarantine, July 1, 1915, to April 20, 1916.

Asst. Surg. Gen. J. W. Kerr, in charge of Division of Scientific Research.

Asst. Surg. Gen. W. C. Rucker, in charge of Division of Domestic Quarantine.

Asst. Surg. Gen. J. W. Trask, in charge of Division of Sanitary Reports and Statistics.

Asst. Surg. Gen. R. H. Creel, in charge of Division of Foreign and Insular Quarantine and Immigration, May 15, 1916, to June 30, 1916.

Chief Clerk, D. S. Masterson.

SCIENTIFIC RESEARCH.

The laboratory and field investigations of diseases of man and other public health matters have been conducted during the year through the Division of Scientific Research. The scope and progress of these investigations are described under subsequent appropriate headings. The investigations have been generally of a systematic character, but some have been undertaken in emergency situations. Among the diseases studied in the several laboratories and in the field are diphtheria, filariasis, malaria, pellagra, pyorrhea alveolaris, scarlet fever, trachoma, typhoid fever, typhus fever, and certain occupational diseases. In addition, studies have been made of problems of industrial hygiene, mental hygiene, school hygiene, rural sanitation, public health organization, and water supplies and sewage disposal. Numerous inquiries received through correspondence and otherwise indicate a growing interest on the part of the public in these subjects. In the case of pellagra, for instance, the demonstration that the disease can be cured and prevented by means of a properly balanced diet, and produced experimentally by an unbalanced diet, has attracted widespread attention. In consequence, physicians and health officers are making practical application of the results here and there where the disease is prevalent.

The problems of vocational diseases and industrial hygiene have likewise received increasing attention and have been subjects of enlarged studies; and these studies looking to the safeguarding of the health of industrial workers and the improvement of living conditions are of great importance to both employer and employee.

By reason of a special deficiency appropriation of $25,000 having been made available February 28, 1916, studies of rural sanitation previously begun were somewhat enlarged and special demonstrations undertaken. Health officials and the public generally have manifested an active interest in these studies and their results, and requests are being received from counties throughout the country for the undertaking of similar studies. A fundamental object of such work is the development of efficient sanitary organization and administration by counties and municipalities, without which no assurance can be had that rural sanitation will be permanently advanced. Malaria, pellagra, tuberculosis, and typhoid fever are types of the diseases in rural districts requiring intensive study. In fact, from the standpoint of these districts they may be regarded as the most important of all preventable diseases. Enlarged facilities for the conduct of investigations and encouragement of local health organization are therefore indicated.

DIPHTHERIA.

OUTBREAK AT MARTINSBURG, W. VA.

On request of the State and local health authorities, Surg. Carroll Fox was detailed November 6, 1915, to make a study of an outbreak of diphtheria occurring in Martinsburg, W. Va., and vicinity and to recommend measures of control. While cases of the disease had been reported in August, 1915, with some increase in September, it was not until the schools opened during the latter month that a rapid increase in the number of cases was reported.

Advice was given by Dr. Fox as to restrictive measures. In addition to the isolation and quarantine of patients and contacts, it was advised that the release of patients from isolation be based on the findings of two negative cultures taken not less than 24 hours apart. In practically every case diphtheria antitoxin was used, and many of the contacts were given an immunizing dose. As a means of reopening the schools, which had been closed October 25, it was decided to open them by grades, a culture to be taken from the nose and throat of each pupil in order to detect and exclude carriers. Other measures were taken by the local authorities and the citizens in accordance with the recommendations made. In order to insure the use of cultural methods for purposes of diagnosis in release of patients from contact, arrangements were made for shipments of specimens regularly by the local authorities to the Hygienic Laboratory. The extent and results of this cultural work are referred to on page 89.

FILARIASIS.

In the Southern Medical Journal for July, 1915, Dr. F. B. Johnson reported that out of 400 individuals examined by him at Charleston, S. C., 77 had been found infected with microfilaria (*Filaria Bancrofti*), the percentage of infection being 19.25. The seriousness of this tropical disease, better known as elephantiasis, and its marked prevalence in one southern city caused the service to take cognizance of the matter, with special reference to the possibility of prevention of the spread of the disease.

On August 13, 1915, Surg. Edward Francis was therefore instructed to undertake systematic investigations of the subject, using the marine hospital at Savannah, Ga., as headquarters for the necessary field and laboratory studies. The plans for the investigations contemplated (*a*) filarial surveys of a number of southern towns for the purpose of determining the extent and degree of prevalence of the infection; (*b*) a determination of the species of mosquito-carrier in the United States; and (*c*) means of prevention of the spread of filariasis.

Filarial surveys.—Blood examinations of a number of persons were made by Surg. Francis in seven southern towns, with the results indicated in the following table:

City.	Number of individuals examined.	Number found infected with microfilariae.
Charleston, S. C.	44	17
Beaufort, S. C.	67	1
Georgetown, S. C.	45	....
Savannah, Ga.	287	....
Milledgeville, Ga.	100	....
Jacksonville, Fla.	200	2
Tampa, Fla.	115	3

Culex fatigans—the carrier.—In considering the species of mosquito responsible for the transmission of filaria, first attention was given by Surg. Francis to a survey of the mosquitoes found in the buildings of an infected institution. Of 1,000 mosquitoes captured in rooms occupied by inmates of such an institution, 902 proved to be *Culex fatigans.* Of 65 *Culex fatigans* caught on the walls and ceilings of rooms of the institution occupied by *filarial patients*, 13 were found on dissection to be infected with filariae. Of 100 *Culex fatigans* caught in rooms of the same institution occupied by patients in whose blood no microfilariae were found, 5 were found on dissection to be infected with filariae.

Of 81 *Culex fatigans* which bit the hands of filárial patients who introduced their hands into cages in which the mosquitoes were confined 54 were found on dissection to be infected with filariæ.

Prevention.—Inasmuch as filariasis is incurable and no means is known of ridding the blood of microfilariae, preventive measures are necessarily dependent upon mosquito eradication. This in the case of *Culex fatigans* is not difficult, because *Culex fatigans* is a domestic mosquito, breeding in fresh water, especially in cisterns, rain barrels, tubs, tin cans, and other unnecessary artificial containers of rain water in back yards. A municipal water supply, piped to every street, alley, and home of a town, coupled with ordinances requiring the use of the city water exclusively and the destruction of all collections of rain water, will rid any community of filariasis. A report of the findings and the measures to be taken was submitted to the city authorities.

Hookworm Disease.[1]

Status of hookworm campaigns.—The five-year period of intensive campaign against hookworm disease, conducted by the southern State boards of health and financed by the Rockefeller Commission, has come to an end. Some of the States stopped the work on December 31, 1914, and by June 30, 1915, all of the State boards had either closed the campaign or changed the plan.

Some of the State boards have continued a plan of intensive community work looking to a reduction of soil pollution. This work is in a certain sense a continuation of or an outgrowth from the hookworm campaign.

Soil pollution.—That the ultimate eradication of hookworm disease lies in the prevention of soil pollution is not to be doubted, and with the gradual reduction of soil pollution a similar reduction of new cases of infection with hookworm disease is to be expected.

In the last annual report statistics were given showing that 250,680 rural homes presented an average sanitary index of only 6.3 per cent. Similarly, extensive statistics for the present fiscal year are not available, but there can be no doubt that certain of the country districts are awakening to the necessity for better home sanitation. This is notably so in those counties in which studies of rural sanitation have been made and in States in which these counties are located.

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[1] Clinical studies on hookworm disease are reported on page 91.

MALARIA.

The investigations of malaria during the past fiscal year have been conducted from the headquarters at New Orleans, La. As in previous years, they have been carried out in cooperation with the health authorities of the States and localities concerned.

Surg. R. H. von Ezdorf has been in general charge of the malaria investigations. Asst. Surg. Gen H. R. Carter has from time to time continued studies on the relation of impounding reservoirs to the prevalence of malaria, having the assistance of members of the general force. This force is now composed of the following persons: Asst. Surg. R. C. Derivaux, Sanitary Engineer J. A. A. LePrince, Technical Assistant M. B. Mitzmain, and Assistant Epidemiologist T. H. D. Griffitts.

In order to facilitate the compiling of observations an outline suggesting lines of research was prepared and furnished to each member of the force engaged in field and laboratory work. In this outline the subject is considered under three general heads, namely: Epidemiology, methods of control, and laboratory investigations.

The epidemiological investigations include observations to be made of the several species of anopheles mosquitoes prevailing in relation to disease propagation; their selection of breeding places; flight; hiding and resting places; habits in relation to man and his environment; attraction and repulsion; hibernation; food; geographical distribution; seasonal prevalence—all as influenced by meteorological and topographical conditions.

The control investigations include studies of the relative value of protective measures, such as screening methods and material; traps; oiling; larvacides; use of natural enemies of mosquitoes; general measures of drainage and filling; light and odors; hand destruction; and fumigants.

Laboratory investigations include the study of the life of infected anophelines and all conditions influencing them.

In the hospital cases of malaria are being studied with reference to immunity, effects of remedies, and their methods of administration.

Economic studies in connection with field surveys are also being made, and data from all available sources, including insurance companies, are being collected.

SURVEYS.

A number of requests were received from State and local health authorities for anopheline mosquito surveys in relation to malaria and for advice as to the best measures for the control of the disease. Preference was given to places where officials gave promise of undertaking antimalaria measures on lines recommended. Thirty such surveys were made in 12 States, as follows:

Alabama: Mobile, Fulton, Lanett, Tuscaloosa, Kaulton, Holt, camp at Lock 12, Coosa River.

Arkansas: Newport (relief committee), State penitentiary at Cummins.

Georgia: Waycross, Brunswick.

Maryland: Baltimore, Anne Arundel County.

Mississippi: Cedars, Electric Mills, Lucedale, Deer Island near Biloxi, Columbus.

North Carolina: Roanoke Rapids.

Ohio: Toledo.
South Carolina: St. Helena Island.
Virginia: Emporia, Wilson, Toshes, Nathalie.
Louisiana: Bastrop, Mandeville.
Missouri: Crystal City.
Texas: Dallas, Sherman.

In most of the places where surveys were made a report of conditions, together with recommendations for the abatement of mosquito-breeding places, was submitted to the mayor and the local health officer.

Antimosquito measures.—The measures generally recommended are, briefly, the following:

(*a*) Regrading and training of streams, creeks, or similar natural watercourses so as to favor a free current.

(*b*) Drainage for the removal of standing water or to produce a movement of water unfavorable to mosquito breeding.

(*c*) Filling in of low places that are too low to drain or which can not be drained economically.

(*d*) Oiling and larvacides.

(*e*) Natural enemies: Stocking with top-feeding minnows is a measure applicable in certain ditches, ponds, pools, swamps, streams, and many other bodies of water.

DEMONSTRATION WORK.

Roanoke Rapids, N. C., and Electric Mills, Miss.—The work of controlling malaria by the application of measures directed against anopheline mosquitoes at Roanoke Rapids, N. C., and Electric Mills, Miss., mentioned in the last annual report,[1] was continued by the local authorities.

At Roanoke Rapids, N. C., a further decrease in the incidence of malaria was shown. The malaria index at this place, as shown by blood examinations in 1913, was 13.75 per cent; in 1914, 4.4 per cent; and in 1915, 3.5 per cent—a decrease in incidence of 74.5 per cent.

At Electric Mills, Miss., the malaria index for 1914 was 11.76 per cent and for 1915, 3.97 per cent—a reduction of 67.7 per cent in the incidence of carriers.

In both places an increase and permanency of population and an increase in the efficiency of labor were noted.

Crystal City, Mo.—On request of the Pittsburg Plate Glass Co., operating a plant at Crystal City, Mo., a malaria survey was made in that city in December, 1915, and plans, recommendations, and estimates of cost submitted. An index secured showed 36 persons, or 5.62 per cent of the 640 persons examined, to harbor the parasite of malaria.

Active ditching work was begun by the company early in the spring under the supervision of officers of the service. The company will probably expend about $10,000 for its first year's work, including the cost of some ditching for purely agricultural purposes.

Dallas, Tex.—In order to carry out measures recommended following a survey made by the service at Dallas, Tex., the city commissioners appropriated on May 1, 1916, $4,500 for antimalarial work.

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[1] See also Reprint No. 328 from the Public Health Reports.

Bastrop, La.—Some antimalaria work has also been undertaken at Bastrop, La.

Cedars, Miss.—Experiencing difficulty in operating their plant on account of malaria among the employees, the Mississippi Veneer & Lumber Co., operating a mill at Cedars, Miss., made request for a survey and advice as to remedial measures.

A malaria index was made by the service, in which the blood of 119 persons connected with the mill was examined microscopically. Forty were found to be carriers, equal to 33.6 per cent.

In accordance with suggestions given, screening of houses, including porches, of white residents was begun in March, 1916. Persons found by blood examination to be carriers were given 5 grains of quinine each daily for two months, during March and April, after which they and all others were given 10 grains a day on two consecutive days each week. No employee is retained by the company unless he consents to take quinine as advised; three persons refused and severed their connection with the company. The company collected 50 cents per month for the curative treatment of carriers and 25 cents per month for quinine furnished for prophylactic (immunization) use.

It has been noted that the health of employees is greatly improved. No malaria had occurred among them up to July 1. Further data will be available at the end of the season.

COOPERATION WITH INTERNATIONAL HEALTH COMMISSION.

The International Health Commission, through Dr. Wickliffe Rose, requested the advice and cooperation of the United States Public Health Service in demonstrations financed by the commission, showing the relative value of various measures used in the control of malaria.

Accordingly, two places for conducting the work were selected, one at Crossett, Ark., representing a town unit, where drainage and oiling are the chief measures; and the second, a number of small plantations near Lake Village, Ark., representing strictly rural conditions, where each family in a house is considered individually and where screening and quinine are the main measures.

One field director has been appointed for each place, and the work is being directly supervised by Asst. Surg. R. C. Derivaux. The work was begun March 20, 1916. Inspections are made each month to follow the progress of the work.

EDUCATIONAL MEASURES.

In connection with the other duties, illustrated lectures dealing with the subject of cause and prevention of malaria were given in a number of places visited during the year. Among them may be mentioned Guyton, Sylvania, Waynesboro, Millen, Statesboro, Metter, Claxton, Pembroke, Reidsville, Ludowici, and Darien, Ga. Lectures were also given in two towns in Leon County, Tex., where some malaria-control work is being undertaken locally.

Addresses have also been made before business men's leagues, chambers of commerce, women's clubs, and like organizations, dealing with the economic and business aspects of malaria.

It has been found that towns having few different industries, such as cotton mill, lumber mill, or glass factory towns, are much more active and desirous of undertaking antimalaria work than the ordinary towns. There is apparently a marked apathy among officials of ordinary towns as compared with towns controlled by manufacturing interests, where the commercial viewpoint in the value of disease prevention is appreciated.

In rural districts, where malaria is a real problem, cooperation is oftentimes difficult to obtain because of the expense required in improving housing conditions and the intangibility of the returns.

RESULTS OF RESEARCH WORK.

Numerous problems of importance and interest relating to malaria have been determined during the year, and in some cases reports of the results published. A summary of results follows:

Determination of infectibility of Anopheles punctipennis.—The determination of the infectibility of Anopheles punctipennis was begun early in the year and completed in January, 1916. Technical Assistant M. B. Mitzmain found Anopheles punctipennis to be infectible to the Plasmodium vivax (tertian malaria) parasite and not to the Plasmodium falciparum (subtertian malaria) parasite. Mr. W. V. King, United States Agricultural Department, reported a month before (December, 1915) that he had succeeded in infecting Anopheles punctipennis with both species of parasites.

Infectibility of Anopheles crucians.—In the course of his investigation Mr. Mitzmain found that Anopheles crucians was infectible to the Plasmodium vivax (tertian) and Plasmodium falciparum (subtertian) parasites.

Transmission experiments with Anopheles punctipennis.—Transmission experiments with Anopheles punctipennis were also carried out. It was determined that:

(*a*) An Anopheline (*A. punctipennis*), once infected, probably remains so and can transmit the (sporozoite form) parasite repeatedly, as instanced in the successful inoculations of 13 persons through the bites of 1 or 2 infected mosquitoes.

(*b*) An infected Anopheline can transmit the infection after a very short bite, before obtaining a feed of blood. Eleven persons were infected following interrupted bites of 1 or 2 mosquitoes within 30 seconds to 1 minute and 20 seconds; 4 persons were infected by the successive interrupted bites of 2 mosquitoes applied in the course of 2 hours and 30 minutes; and 2 persons were infected by the interrupted biting of 1 mosquito within 5 minutes.

(*c*) The incubation period was nearly the same for all 14 persons, between 13 and 19 days, averaging 14 days.

Hibernation studies.—Hibernation studies, involving the dissection of 1,582 specimens of hibernating anophelines and the examination of the blood of 1,184 persons, indicated the following:

(*a*) Malaria parasites are not carried over from fall to spring in the body of the mosquito.

(*b*) The Plasmodium remains latent during the winter in the blood of man, as proven in this investigation, wherein 492 persons were found to be infected.

Further laboratory studies of Anophelines.—Other results of laboratory studies of anophelines showed that:

(*a*) Gravid anophelines subjected to temperatures of 4.5° C. to 12.5° C. did not lay eggs; but with a rise of temperature between 16° C. and 21° C. egg laying was increasingly favored. This confirmed field observations, where it was found (in Scott, Miss.) that anopheline breeding commenced when the mean atmospheric temperature reached 16° C. (after Apr. 15).

(*b*) *Anopheles punctipennis* females were kept alive on a blood diet, 1 for 82 days and 1 for 111 days; an *Anopheles quadrimaculatus* was kept alive on dates and water 68 days; 1 male *Anopheles quadrimaculatus* survived 62 days and 1 male *Anopheles punctipennis* 64 days.

Flight of Anopheles quadrimaculatus.—Some interesting observations of practical importance regarding anophelines as carriers of malaria were also made during field investigations. In one instance it was seen that *Anopheles quadrimaculatus*, both males and females, are capable of flying a direct distance of 3,000 feet.

Breeding places of Anopheles punctipennis.—Asst. Surg. Gen. H. R. Carter, in charge of the studies of impounded waters and their relation to malaria during the year, called attention to the preference of *Anopheles punctipennis* for breeding along rapidly moving water-courses, such as creeks, while *Anopheles quadrimaculatus* rarely did so. He also collected definite data showing that *Anopheles punctipennis* is infrequently found in human habitations, whereas *Anopheles quadrimaculatus* is commonly, if not almost exclusively, found there. These observations applied to districts where both species were present.

This was confirmed in surveys by other members. Further observations will be made on this point, as it will be of great sanitary importance in considering control measures. The determination that *Anopheles punctipennis* can be infected with the Plasmodium of malaria may then have only a scientific interest, and may not prove of epidemiological importance.

Importance of these field observations.—It can be seen that, if the two field observations regarding *Anopheles punctipennis* are confirmed, much money will be saved to communities undertaking anti-malaria work.

Similar observations regarding habits of *Anopheles crucians* are being followed which indicate that this species is, in a degree, of negligible importance in the spread of malaria.

There appears to be no doubt that *Anopheles quadrimaculatus* is the chief species in the southern States concerned in the transmission of malaria.

Types of infection.—In response to a request by circular letter, mailed to physicians representing every parish in the State of Louisiana, requesting them to furnish blood smears from their active and chronic cases of malaria—slides, slide boxes, history blanks, and franks for mailing being furnished—300 blood smears were received, of which 84 from 18 parishes were found to be tertian; 43 from 13 parishes, estivo-autumnal.[1]

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[1] There is a total of 64 parishes in the State.

Through the kindness of Drs. T. J. Dimitry and J. A. Estopinal, 470 blood smears were secured from school children in St. Bernard Parish, La. These were examined by Passed Asst. Surg. R. A. Herring, who found only 4 positives, all of the tertian type.

Malaria index work.—The microscopical examination of blood specimens secured for determining the malaria index in given places was continued. The malaria index was made during this year in the following-named places:

Alabama: Mobile, 884 examined; 44 infected; 4.97 per cent. Fulton, 402 examined; 20 infected; 4.97 per cent. Lanett, 646 examined; 1 infected; 0.15 per cent. Kaulton, 234 examined; 21 infected; 8.97 per cent. Holt, 305 examined; 9 infected; 2.95 per cent. Tuscaloosa, 767 examined; 35 infected; 4.56 per cent.

Missouri: Crystal City, 640 examined; 36 infected; 5.62 per cent.

Louisiana: St. Barnard Parish, 470 examined; 4 infected; 0.85 per cent.

Mississippi: Cedars, 119 examined; 40 infected; 33.6 per cent. Lucedale, 213 examined; 12 infected; 5.63 per cent.

North Carolina: Roanoke Rapids, 968 examined; 34 infected; 3.51 per cent.

From the beginning of 1912 to June 30, 1916, a total of 20,462 persons have been examined, of which number 2,561, or 12.51 per cent, were found to harbor parasites of malaria. These examinations were made among persons residing in the States of Alabama, Arkansas, Mississippi, Missouri, Louisiana, North Carolina, South Carolina, and Virginia.

On analyzing the records, the following interesting facts appear:

1. One of every eight persons examined was found to be a carrier.
2. The percentage of infection among whites was 8 per cent and that among the colored 20 per cent.
3. The percentage of carriers was highest among those 3 years of age and under. The extreme ages of persons found infected were 9 months and 85 years.
4. The tertian type was most prevalent, the proportion being practically 2 cases of tertian to 1 of estivo-autumnal.
5. The quartan type was extremely rare; only two pure quartans and 1 mixed quartan and tertian were found in a total of 2,561 infections.
6. The percentages of infection according to places varied from 1.7 per cent to 40.9 per cent.
7. Mississippi showed the highest percentage of infection among those examined.
8. About 1 of every 4 infected persons harbors the sexual (gametocyte) forms necessary for infecting a malaria-bearing mosquito.

A report covering the malaria index work has been published in the Public Health Reports and issued as Reprint No. 331.

STUDIES OF RICE CULTURE IN RELATION TO MALARIA PREVALENCE.

Studies of anopheline mosquitoes in relation to malaria in regions where rice is cultivated are being continued at Stuttgart, Ark., and during this year like studies were begun at Crowley, La. Visits will be made to these places throughout the coming year, and as soon as sufficient data are available, a report will be made dealing with the question as to whether rice culture has resulted in an increase of malaria.

HEMOGLOBINURIA.

Reports of cases of hemoglobinuria were received from physicians in the States of Arkansas, Florida, Georgia, Louisiana, North Carolina, Tennessee, and Texas. This disease occurs chiefly during the fall and winter months and is only reported at places where malaria prevails. Inquiry regarding this disease is invariably made at all places visited, where it is generally known as "blackwater," "swamp fever," or "yellow jaundice." Physicians report that cases occur in the lowlands, and rarely in towns.

IMPOUNDED WATER.

The investigation of the effect of impounded water on the incidence of malaria, begun in 1914, was continued under the direction of Asst. Surg. Gen. H. R. Carter. During the calendar year 1915 surveys were made of the following bodies of water: The pool of Lock 12 on the Coosa River; the pool of Lock 17, Black Warrior River; the pond of the Parrs Shoals hydro-electric power plant; and the pond of the Georgia and Carolina hydro-electric power plant at Stevens Creek. The first two are in Alabama and the last two in South Carolina. In addition a brief survey was made of two ponds of water of the Tennessee Coal, Iron & Railroad Co., near Birmingham, Ala. Incidental to other work a survey was also made of three small ponds in Virginia. The results of these surveys are reported in a bulletin now in press. During the present calendar year surveys have been made at Colleton, S. C., and Whitney, N. C.

The investigations include the making of physical and biological surveys, the first to determine whether the physical conditions are such as to make the places examined suitable breeding places for mosquitoes, and the second to determine what places are actually breeding malaria-bearing mosquitoes. On the basis of information so far obtained in these investigations, definite recommendations are made to the authorities as to necessary steps to be taken for better sanitation as regards malaria. In order to reach more comprehensive conclusions these studies will be continued for a number of years.

COOPERATION WITH BUREAU OF FISHERIES.

Beginning with the first of the year, the Bureau of Fisheries of the Department of Commerce has supplied certain species of mosquito-eating fishes within a radius of from 12 to 18 hours' railroad journey from its stations at Edenton, N. C., and San Marcos, Tex. The Bureau of Fisheries has announced its intention of extending this service to other stations in the near future after the solution of some problems in the economic distribution and transportation of the fish.

COOPERATION IN MOSQUITO CAMPAIGN AT BALTIMORE, MD.

On request of the mayor Sanitary Engineer William D. Wrightson was granted leave to direct the work of a mosquito commission at Baltimore, Md., during the summer of 1915. The city was divided into four sanitary districts and a campaign of eradication carried out throughout the summer. At the end of the work Mr. Wrightson submitted a report, which included recommendations in regard to the details of conduct of similar work in 1916.

MALARIA STUDIES IN ANNE ARUNDEL COUNTY, MD.

During the course of rural sanitation studies in Anne Arundel County, Md., Asst. Surg. R. C. Derivaux was instructed to carry on simultaneous investigations of malaria. The work began in the previous fiscal year and continued through last summer. It was found that, while present to the extent of probably several hundred cases annually malarial fever does not represent a particularly urgent problem in Anne Arundel County. For this reason it was recommended that measures for its control on the part of individuals would be preferable to an extensive campaign to eradicate the mosquito, the cost of which would be out of all proportion to the results to be gained. However, it was felt that antimosquito work was applicable in cities and towns. The one measure that would be productive of the greatest benefit would be a thorough campaign of education as to the nature of malaria, the mode of its transmission, and the methods for its prevention which can be applied by residents.

SURVEY AT TOLEDO, OHIO.

On request of the State and local boards of health, Surg. Carroll Fox was detailed to make a mosquito survey of Toledo, Ohio, in relation to disease prevalence. The survey lasted from June 21, 1915, to July 18, 1915. It was found that, although malaria was formerly a common disease in and around Toledo, with the growth of the city the greater part of the swamp land has been reclaimed and malaria has become an uncommon malady. The few cases reported to the health department in recent years have been imported into the city from outlying malarial sections.

PUBLICATIONS.

The following publications of the service during the past fiscal year relate to malaria.

REPRINTS FROM THE PUBLIC HEALTH REPORTS.

290. **Anopheles as a Winter Carrier of Plasmodium.** The mosquito as a prophylactic indicator. By M. Bruin Mitzmain. July 16, 1915.
324. **Anopheles Punctipennis Say.** Its relation to the transmission of malaria. Report of experimental data relative to subtertian malarial fever. By M. Bruin Mitzman. February 11, 1916.
328. **Demonstrations of Malarial Control.** By R. H. von Ezdorf. March 10, 1916.
331. **Endemic Index of Malaria in the United States.** By R. H. von Ezdorf. March 31, 1916.
337. **Tertian Malarial Fever.** Transmission experiments with anopheles punctipennis. By M. Bruin Mitzman. May 12, 1916.

PUBLIC HEALTH REPORTS.

May 19, 1916. **The control of Malaria.** Whirligig beetles (Dineutes) as a possible factor. R. C. Derivaux.

PELLAGRA.

Field investigations of pellagra have been conducted during the past fiscal year, under the direction of Surg. Joseph Goldberger, at three orphanages, two located in Jackson, Miss., and one in Columbia, S. C., at the Georgia State Sanitarium, Milledgeville, Ga., at the State prison farm near Jackson, Miss., and in seven mill villages in Spartanburg, Oconee, and Chester Counties, S. C. In addition, Dr. Goldberger has visited many localities, principally in the South, for the purpose of investigating peculiarities or eccentricities of pellagra prevalence. Studies of this character were made in Alabama, Arkansas, Louisiana, North Carolina, and Texas.

Special studies of pellagra have also been conducted at the laboratory of the United States Pellagra Hospital, Spartanburg, S. C., under the direction of Prof. Carl Voegtlin, the hospital work in that city being in charge of Passed Asst. Surg. R. M. Grimm.

Researches conducted during the past year serve to confirm the proposition that pellagra is due to the use of an unbalanced diet.

VALUE OF DIET IN TREATMENT.

A study of the value of diet in the prevention of pellagra at two orphanages and at an asylum for the insane was begun in 1914. The object of this study was to determine whether it was possible to prevent what has from the earliest history of the disease been regarded as almost absolutely inevitable, namely, the recurrence of the attack in one who has had the disease the preceding season.

The two orphanages are located in Jackson, Miss. At both, cases of pellagra have been recognized annually for several years. During the spring and summer of 1914, up to September 15, a total of 209 cases of pellagra was observed in the children of these orphanages. Since about the middle of September, 1914, the diet at both orphanages has been modified in accordance with the instructions of the officer in charge of these investigations.

Through the courtesy and with the cooperation of the officers and staff of the Georgia State Sanitarium, two wards of pellagrins at that institution were made available for study in the fall of 1914.

A preliminary report of the results of the study at these institutions was made in October, 1915. (Reprint No. 307 from the Public Health Reports.) Of the 209 cases of pellagra observed at the two orphanages during the spring and summer of 1914 and up to September 15 of that year, not less than 172 completed at least the anniversary date of their attack under observation. In only 1 of these 172 pellagrins, following the change in diet, was there recognized during the year 1915 evidence justifying a diagnosis of a recurrence. Nor was there any new case in any of the nonpellagrin residents, 168 of whom were continuously under observation for at least one year. Recent admissions aside, during 1915 there was no pellagra at one and but a single case at the other of these institutions.

Of the insane pellagrins studied at the Georgia State Sanitarium, 72 remained continuously under observation up to October 1, 1915, or at least until after the anniversary date of their attack of 1914.

Not a single one of this group presented recognizable evidence of a recurrence of pellagra, although, of a group of 32 control pellagrins not receiving the modified diet, 47 per cent had recurrences during the corresponding period.

These results very clearly indicated that pellagra could be prevented by an appropriate diet. The great importance, both theoretical and practical, of this result made it desirable to continue and to enlarge the scope of this investigation. Accordingly, the study at the two orphanages and at the Georgia State Sanitarium has been continued. At the latter the study was enlarged by including an additional ward about November 1, 1915. The scale of the investigation was also enlarged by including an orphanage located at Columbia, S. C. At this orphanage, in spite of various efforts made for its control, pellagra has occurred in varying degree from year to year since it was recognized there in about 1908. In 1915 there were recognized in all upward of 100 cases among the children.

The Public Health Service began its study at this institution on September 1, 1915, Asst. Surg. W. F. Tanner being detailed in local charge. Here, as at the other institutions, the diet was modified in accordance with the instructions of the officer in charge, the fresh animal protein foods and legumes were increased and the carbohydrate components of the ration reduced.

At the close of the fiscal year, June 30, 1916, there is every indication that the results of these continued and enlarged investigations of the second year will confirm the results of the first year's study, namely, that pellagra is preventable by an appropriate diet.

In connection with this study it was deemed highly desirable for the purpose of definitely establishing the character of various skin manifestations observed at the orphanage at Columbia, S. C., and at the Georgia State Sanitarium to obtain the expert services of Dr. John A. Fordyce, professor of dermatology at the College of Physicians and Surgeons, New York City. Prof. Fordyce visited these institutions for this purpose May 10–14, 1916.

Furthermore, by reason of the striking results in the elimination of pellagra among the groups of pellagrins studied, it seemed desirable that independent confirmation be had of the observations of the officers in charge. Accordingly, Passed Asst. Surg. R. M. Grimm was detailed to make an examination of the service patients at the orphanage at Columbia, S. C., and at the Georgia State Sanitarium, and Surg. C. H. Lavinder was detailed to examine these patients and also the patients at the orphanages at Jackson, Miss. These officers made their examinations during the last week of May, 1916, and reported no pellagra present in any person under observation.

EXPERIMENTAL PELLAGRA IN THE HUMAN SUBJECT.

A study of the possibilities of producing pellagra in the human subject by means of a faulty diet was begun in February, 1914, at the State prison farm near Jackson, Miss., with Asst. Surg. G. A. Wheeler in local charge. This study was made possible by the cooperation of Gov. Earl Brewer, who, by promising a pardon, obtained and placed at the disposal of the service 12 convict volunteers.

This study was continued to November 1, 1915. At the end of this period 6 of the 11 volunteers who remained throughout the test developed pellagra. A brief preliminary report of this experiment was published in the Public Health Reports and issued as Report No. 311.

RELATION OF CERTAIN ECONOMIC FACTORS TO PREVALENCE OF PELLAGRA.

An analysis of economic data bearing on the possible connection between the increasing prevalence of pellagra and the rise in the cost of food was made by Public Health Statistician Edgar Sydenstricker and published in the Public Health Reports (Reprint No. 308). This analysis indicated that such a connection might be possible.

In the spring of 1916 there was accordingly organized and inaugurated a field study of the relation of certain factors of an economic character to pellagra prevalence in mill village communities. The headquarters of this investigation have been established at Spartanburg, S. C., with Asst. Surg. G. A. Wheeler in local charge.

The investigation includes seven cotton-mill villages, of which four are in Spartanburg County, two in Oconee County, and one in Chester County. About 850 family schedules have been obtained. Wherever practicable the family store accounts were also obtained. This study will be continued during the next fiscal year. It is anticipated that valuable data will be obtained relating to such factors as annual family income, availability of food supply, seasonal variation in food supply, and the relation of these to pellagra incidence.

SPECIAL STUDIES OF PELLAGRA AT SPARTANBURG, S. C.

The special studies of pellagra have been continued at the service hospital and laboratory at Spartanburg, S. C. The work there has been more extensive and intensive than during the previous fiscal year, but has been carried out along the same general clinical and laboratory lines. The personnel of the station has been 1 passed assistant surgeon (medical officer in charge), 2 assistant surgeons, 1 pharmacist, 3 clerks, 1 biochemist, 2 assistant biochemists, 1 organic chemist, 1 food analyst, 1 dietitian, 1 field nurse, 6 hospital nurses, and 12 attendants.

The laboratory work has been under the immediate supervision of Prof. Carl Voegtlin, while the clinical work has been under the direction of Passed Asst. Surg. R. M. Grimm, who has also been in administrative charge of the station.

Clinical work.—The clinical work at the station has consisted of the treatment and observation of hospital and outpatients at the hospital building, and of a limited number of special patients at their homes in and around Spartanburg. During the year a large number of persons have applied at the hospital for examination and advice, and a number of consultations at the request of the local physicians have been granted.

The treatment of the hospital patients has consisted almost exclusively in the administration of well-selected diets. A few drugs have been used from time to time for minor complications, but none have been administered consistently as part of the treatment for pellagra.

On July 1, 1915, there were 31 patients under treatment; 120 were admitted during the year, 9 of whom were readmitted; a total, therefore, of 151 received treatment for a period of 8,969 days. Of these, 94 were discharged improved, 23 discharged unimproved. and 3 died. Thirty-one remained under treatment June 30, 1916.[1]

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[1] It is to be noted that a number of those classified as discharged "improved" presented on discharge no active or residual symptoms of pellagra; but on account of the uncertain nature of the disease the more conservative term "improved" has been employed instead of the words "recovered" or "cured."

Of the outpatients, there were under treatment July 1, 1915, 12 patients; 28 were admitted during the year, 3 of them having been readmitted; 40 were, therefore, treated during the year. Of these, 15 were discharged improved[1] (without having shown any return of active symptoms of pellagra), 5 were discharged unimproved. A total of 5,555 treatments (meals) have been furnished to these outpatients. Twenty remained under treatment June 30, 1916.

The treatment of 40 outpatients has consisted of serving at the hospital building each day one generous and well-selected midday meal. A more or less necessary placebo has also been given with this treatment. The outpatient department has served a twofold purpose—to keep the hospital in touch with the local pellagra situation and to furnish data which will be of value from the standpoint of treatment and prevention of pellagra. While taking this daily meal at the hospital, none of these patients have shown any return of active pellagra symptoms, and although a few have been discharged unimproved the majority have been able to attend to their affairs throughout the period of treatment.

The care and treatment of the hospital and outpatients have been under the supervision of the medical officer in charge, assisted by Asst. Surg. W. F. Tanner until August 30, 1915, when Dr. Tanner was relieved and his duties were assumed by Asst. Surg. R. L. Allen. The cases have been followed carefully during treatment, and detailed clinical and dietary records have been obtained. Routine clinical laboratory examinations have also been made.

While no definite conclusions have yet been drawn from the clinical work, it has been found, as a rule, that those patients who have continued treatment over a reasonable length of time have shown remarkable improvement. Relief from care, worry, and responsibility while in the hospital has undoubtedly been a factor in favor of the hospital patients. Analysis and comparison of the clinical and dietary data which are being collected at the station will probably be of great value in showing a definite relationship between certain articles of diet and the treatment of pellagra with maximum success.

In addition to the hospital and outpatients who have been treated at the hospital building, a limited number of pellagrins living in Spartanburg and vicinity have received treatment at their homes. The treatment of these patients has consisted of the administration of special preparations made in the station laboratory under the direction of Prof. Voegtlin.

Dietary studies in pellagrous and nonpellagrous families.—In order to elucidate the question as to how diet leads to pellagra it was essential to obtain accurate information as to the qualitative and quantitative composition of the food consumed by persons suffering from pellagra. Twenty-two families in Spartanburg County, S. C., were selected for this purpose. These families were representative of the population of the cotton-mill villages where pellagra has been endemic for several years past. The families were divided into two groups: Group "A" included families in which there had not occurred any pellagra; group "B" was composed of families in which one or several members were affected with this disease. The general hygienic conditions of both groups were practically the same. The food supply of these families was computed during the whole year and the families were examined from time to time as to the occurrence of pellagra. The families of group "A" (nonpellagrous) remained free from the disease during the whole period of investigation (one year and a half).

The main result of the investigation was that the nonpellagrous families in every case had a more satisfactory supply of such foods as milk, eggs, and fresh meat than the pellagrous families. It was noted that the families of group "A" usually kept a cow, which, of course, meant that they were supplied with milk. This observation was made also in many other families living in this section of the country. The general economic condition of these people (group A) was also investigated. The results of these studies will be subsequently reported.

Without going into detail it may be said that the diet consumed by pellagrous families is deficient in certain food components, an observation which, together with other evidence, supports the so-called deficiency theory of pellagra.

Changes in vitamine content of bread.—A discussion of changes in the vitamine content of bread with reference to the occurrence of polyneuritis was published in the Public Health Reports during the year and issued as Reprint No. 333. On the basis of extensive animal experiments, it was shown that highly milled flour is deficient in vitamines and that, where these are not sufficiently provided in other parts of the diet, insufficient nutrition may result. It was also concluded that corn bread prepared by means of baking soda without the addition of buttermilk or sour milk is deficient in vitamines and that this deficiency is due to the destructive action of the alkali (baking soda) on the vitamines in these foods.

Metabolism in pellagra.—This phase of the investigation was extended during the year, and it can now be considered as well advanced. The chemical composition of the blood, urine, and gastric contents from the patients at the hospital was carefully studied in detail. The milk secreted by pellagrins was also submitted to an extensive chemical analysis. The question of the occurrence of pellagra in early childhood received special attention. A collective manuscript including the results obtained in these studies was recently prepared.

Vitamine treatment of pellagrins.—In order to prove definitely that a disease is of dietary origin it is essential to determine the chemical character of the diet which gives rise to the disease. It has been suggested that pellagra is due to the consumption of a diet deficient in certain food elements (vitamines). It was therefore essential to determine the therapeutic effect of vitamines on the course of the disease. As stated above, the diet of pellagrous families in Spartanburg County, and very probably elsewhere in pellagrous countries, is obviously deficient in vitamines. Preliminary therapeutic tests of such preparations were made during the past two years.

In order to continue these studies efforts have been made during the past year at the Hygienic Laboratory (see p. 93) and also at Spartanburg to obtain such physiologically active food components from various raw materials. A large number of vitamine preparations were accordingly obtained from brewer's yeast, ox liver, wheat bran, rice polishings, and field peas. These substances are now being tested as to their curative action on pellagrins.

Animal experiments.—Extensive feeding experiments of wheat and corn products were made in order to determine their content in so-called vitamines. The results conclusively show that the modern "patent" wheat flour and corn grits obtained from roller mills are deficient in vitamines. On the other hand, graham flour, whole-wheat flour, and rock-ground (whole) meal contain more of these elements.

Food analysis.—The foods used at the Pellagra Hospital were analyzed for their content in protein, carbohydrates, fats, inorganic salts, and calories.

Dietary treatment of pellagra.—Several diets of different composition were tested out as to their curative action on the hospital patients. This work, which has been in progress since August, 1914, has now been completed.

MENTAL MANIFESTATIONS OF PELLAGRA.

An article by W. F. Lorenz, formerly special expert, Public Health Service, on "The mental manifestations of pellagra," was published in the Public Health Reports for February 4, 1916, and issued as Reprint No. 322. The article reports investigations made at the Georgia State Sanitarium during the spring and summer of 1914. Since this work has not been previously reviewed in the annual reports of the service, the following conclusions reached by Dr. Lorenz are given:

"The phychosis that accompanies pellagra has the characteristics of the toxic psychoses in 90 per cent of the uncomplicated cases admitted to an institution for the insane.

"It has great resemblance to the acute alcoholic psychoses.

"When pellagra develops in an individual already insane synchronously with the physical manifestation, a mental confusion or delirium may be added to the existing psychosis.

"Were an etiology to be suggested from the mental disturbances alone, the causes would fall among a group of agents similar to alcohol in that they are not products of bacterial or parasitic invasion of the body, but chemical intoxicants in the narrower sense."

PUBLICATIONS.

Of the publications of the service during the past fiscal year the following related to pellagra:

HYGIENIC LABORATORY BULLETINS.

102. II. **Preliminary Observations on Metabolism in Pellagra.** By Andrew Hunter, Maurice H. Givens, and Robert C. Lewis.

103. I. **Chemical Changes in the Central Nervous System as a Result of Restricted Vegetable Diet.** By Mathilde L. Koch and Carl Voegtlin.
    II. **Chemical Changes in the Central Nervous System in Pellagra.** By Mathilde L. Koch and Carl Voegtlin.

REPRINTS FROM PUBLIC HEALTH REPORTS.

307. **The Prevention of Pellagra.** A test of diet among institutional inmates. By Joseph Goldberger, C. H. Waring, and David G. Willets. October 22, 1915.

308. **The Prevalence of Pellagra.** Its possible relation to the rise in the cost of food. By Edgar Sydenstricker. October 22, 1915.

311. **Experimental Pellagra in the Human Subject Brought About by a Restricted Diet.** By Joseph Goldberger and G. A. Wheeler. November 12, 1915.
322. **Mental Manifestations of Pellagra.** By W. F. Lorenz. February 4, 1916.
325. **Vitamines and Nutritional Diseases.** A stable form of vitamine, efficient in the prevention and cure of certain nutritional deficiency diseases. By Atherton Seidell. February 18, 1916.
333. **Bread as a Food.** Changes in its vitamine content and nutritive value with reference to the occurrence of pellagra. By Carl Voegtlin, M. X. Sullivan, C. N. Myers. April 14, 1916.
339. **Pellagra.** Laboratory Examinations in connection with the disease. By J. R. Ridlon. May 19, 1916.

PUBLIC HEALTH REPORTS.

March 31, 1916. **Diet and pellagra.** Rabbits and hares as a possible dietary factor in combating the disease. By C. W. Stiles.

PYORRHEA ALVEOLARIS.

An investigation of the curative effects of ipecac and emetin in pyorrhea alveolaris was conducted at the Fort Stanton Sanatorium for Tuberculosis and a report by Asst. Surg. John S. Ruoff published in the Public Health Reports and issued as Reprint No. 320. It was found that emetin is an amebicide, but alone will not cure pyorrhea aveolaris. Less confidence will hereafter be placed in the properties of this and other preparations of ipecac, although it is not denied that the drug does possess amebicidal properties. Just how much assistance is to be expected from the ipecac preparations used in conjunction with operative measures is a question upon which furtheir studies may be expected to throw some light.

TRACHOMA.

Trachoma work in the Appalachian Mountains.—As the establishment of small hospitals in known infected districts has proved the best method of eradicating and preventing trachoma, this work has been extended by the service along the same lines during the past year. The longer these hospitals are established the more the people appreciate their importance and necessity. Not only do they serve well the purposes for which they were established, but they act as centers for creating an interest in public health generally heretofore unknown. Many people living in rural and isolated districts previously skeptical or even antagonistic to sanitary measures have been taught by the doctors and nurses at these hospitals that trachoma and many other diseases are due solely to their way of living and are entirely preventable. By precept and example they are shown that prevention is better than cure and taught the simple rules of personal hygiene. Furthermore, the beneficial results obtained at the field clinics in old trachoma cases, many of whom have been practically blind for years, arouse the intense interest and enthusiasm of the community and insure a large attendance of persons eager to learn about health protection.

Location of hospitals.—During the past fiscal year, in addition to the three original trachoma hospitals in Kentucky, two others have been in operation in Coeburn, Wise County, Va., and Welch, McDowell County, W. Va. The Coeburn hospital was ready for the reception of patients on July 1, 1915, but the other was not opened until about October 1. This makes a total of five trachoma hospitals in operation at the close of the fiscal year. All arrangements have been completed for extending the work into Tennessee, and a trachoma hospital will be established at Tazewell, Claiborne County, Tenn., about August 17, 1916. The central office will remain at Lexington, Ky.

The original survey in 1913 showed Knott County to be heavily infected with trachoma and the first of these hospitals was therefore established in Hindman, the county seat, situated 20 miles from a railroad. In this manner treatment was given to hundreds of trachoma victims who would otherwise never have found relief. According to Surgeon McMullen, this county is now practically free of the disease and probably has less infection than any other county in Kentucky. The hospital will therefore be moved to another infected district in a short time.

Cooperation of State and local authorities.—The State and local authorities are cooperating in the work. The local authorities at London, Ky., Coeburn, Va., and Welch, W. Va., furnish suitable two-story buildings, rent free, for the use of the hospitals, while Breathitt County, Ky., contributes toward the rental of a building for the Jackson Hospital. The local authorities at Tazewell, Claiborne County, Tenn., are making extensive improvements on the house they have agreed to furnish for the use of the hospital to be placed there.

During the year just ended the State of Virginia contributed $1,200 toward the maintenance of the Coeburn Hospital and West Virginia $600 for the Welch Hospital. The State board of health of Kentucky proposes to contribute $500 to the work in the State during the next fiscal year.

The service endeavors to educate one or more of the local physicians to do the work at all of the trachoma hospitals, in this manner preparing the way for the establishment of similar hospitals by the local authorities after the discontinuance of service operations in these localities.

Eradication.—These hospitals, with a capacity of only 15 or 20 beds, are often crowded, and unable to care for the numbers of patients seeking relief.

Persons treated.—During the past year the total daily attendance at the five trachoma hospitals was 19,530. Twenty thousand five hundred and forty-five treatments were given to dispensary patients. This, added to the 91,510 treatments given to the hospital cases, makes a total of 112,055 individual treatments given during the year by the doctors and nurses at these five hospitals. Nearly one-half of the number applying for relief for trachoma were found to have impaired vision. This ranged all the way from slight defects to total blindness as a result of trachoma. Many of these cases were among school children who were relieved of their trachoma while it was in the incipient stage and before the visual damage had been done.

A total of 1,880 persons were treated in the hospitals during the year. These were furnished subsistence and, as previously stated, given 91,510 individual treatments, an average of about 50 treatments per patient. There were 1,832 cases discharged from the hospitals, leaving 48 remaining under treatment at the beginning of the new fiscal year.

The total days relief furnished was 18,302, and the number of rations furnished was 20,776. The total cost of rations furnished at the five hospitals was $7,849.55. The average cost of a ration was therefore 37.7 cents. The cost of the ration was materially increased on account of the fact that subsistence for the patients is necessarily contracted for at one of the hospitals at a much higher price than the cost of the other four hospitals where patients are subsisted in the hospitals. There were 1,687 operations performed at the five hospitals during the year, 534 of which were under general and 1,153 under local anaesthesia.

The following table gives the dispensary and hospital relief, and also the relative frequency of sequelæ.

Dispensary and hospital treatment, cost, operations, etc.

	Jackson Hospital.	London Hospital.	Hindman Hospital.	Coeburn Hospital.	Welch Hospital. (9 months).	Grand Total.
DISPENSARY RELIEF.						
Old cases applying for treatment, all causes	5,032	1,278	1,742	1,519	1,980	11,551
Old cases applying for treatment, trachoma	4,506	968	1,594	783	1,320	9,171
New cases applying for treatment	1,584	2,238	689	2,200	1,259	7,970
Total daily attendance	6,616	3,516	2,431	3,719	3,248	19,530
Total number treatments given	7,054	3,514	2,816	3,748	3,413	20,545
Average daily attendance	18	9.6	6	11	12	57
New trachoma cases	530	495	324	492	259	2,100
Cases of impaired vision from trachoma	228	237	190	166	100	921
Cases corneal opacity from trachoma	104	86	87	72	132	481
Cases blindness both eyes from trachoma	1	6	3	2	2	14
Cases blindness one eye from trachoma	6	28	23	4	4	65
Cases ulcer from trachoma	55	36	39	25	30	185
Cases pannus from trachoma	105	64	119	48	53	389
Cases entropion from trachoma	51	52	38	25	28	194
Cases trichiasis from trachoma	34	38	15	21	15	123
Cases photophobia from trachoma	213	205	96	55	190	759
Cases conjunctivitis	486	349	77	232	352	1,496
Cases glaucoma	2	3	1	3	2	11
Cases trachoma cured during the year	217	232	268	96	103	916
HOSPITAL RELIEF.						
Cases remaining from previous year	9	....	10	....	....	19
Cases admitted during the year	399	387	418	399	258	1,861
Total hospital cases during year	408	387	428	399	258	1,880
Cases discharged during the year	395	377	420	396	244	1,832
Cases remaining at close of year	14	10	7	3	14	48
Days relief furnished	4,981	2,903	5,292	3,154	1,972	18,302
Rations furnished	6,525	4,534	4,771	1,778	3,168	20,776
Cost of rations furnished	$2,019.21	$1,178.27	$2,147.40	$1,398.67	$1,106.01	$7,849.56
Treatments given hospital patients	....	....	....	....	....	91,510
Treatments given dispensary patients	....	....	....	....	....	20,545
Total individual treatments	....	....	....	....	....	112,055
OPERATIONS.						
Operations under general anæsthesia	158	94	104	123	55	534
Operations under local anæsthesia	219	289	208	252	185	1,153
Total number of operations	377	383	312	375	240	1,687

The patients treated at these hospitals came from counties throughout the State of Kentucky and from many counties in West Virginia, Virginia, Tennessee, and Ohio, as follows:

Jackson Hospital.—Kentucky: Bath, Bell, Breathitt, Carter, Clark, Clay, Elliott, Estill, Fayette, Fleming, Greenup, Jessamine, Johnson, Knott, Lee, Leslie, Letcher, Lewis, Madison, Magoffin, Menifee, Montgomery, Morgan, Ohio, Owsley, Perry, Pike, Powell, Rockcastle, Rowan, Washington, Wolfe. Virginia: Dickenson. West Virginia: Wayne.

Hindman Hospital.—Kentucky: Boyle, Breathitt, Carter, Floyd, Harlan, Jessamine, Johnson, Knott, Lawrence, Lee, Letcher, Madison, Magoffin, Perry, Pike, Powell, Pulaski. Virginia: Dickenson, Wise.

London Hospital.—Kentucky: Adair, Bell, Carter, Clay, Garrard, Graves, Harlan, Hart, Jackson, Knox, Laurel, Leslie, Letcher, Madison, Marion, Morgan, Perry, Pulaski, Rockcastle, Trigg, Wayne, Whitley. Tennessee: Claiborne.

Welch Hospital.—West Virginia: Cabell, Kanawha, Lincoln, Logan, McDowell, Mingo, Raleigh, Roane, Wayne, Wyoming. Virginia: Buchanan, Tazewell. Ohio: Jefferson. Kentucky: Boyd, Lawrence.

Coeburn Hospital.—Virginia: Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, Washington, Wise. Kentucky: Bell, Harlan, Leslie, Letcher, Pike.

The number of cases of trachoma recorded as cured during this year was 916 and represents only those who were actually seen by the medical officer in charge, and therefore known to be cured. A very great number of the cases live long distances from the hospital and when relieved of their disease, and therefore not compelled to return, are not seen after a cure is effected, and their record cards remain incomplete as to the result obtained. This is true in a large number of cases, and it is believed that 50 per cent more than the recorded number would be a conservative estimate of the actual number of cures.

A very large percentage of these trachoma cases are helpless adults unable to earn a livelihood and children denied an education. Apart from the public-health and humanitarian aspects, the relief of this large number of eye sufferers has an economic importance impossible to estimate.

Prevention.—The work of sanitation, which is, of course, of equal importance to that of eradication, has been carried on much in the same manner as during the previous year. The gradual perfection of the organization, however, has made it possible to extend this phase of the work and to reach a much larger number of people. Besides the house to house visits made by the hospital doctors and nurses, one nurse was detailed exclusively for the district work. During 10 months, beginning September 1, she visited 2,820 homes in the vicinities of the London, Ky., and Coeburn, Va., hospitals and in neighboring counties. There were 15,510 persons in these homes, and 494 of them were reported by the nurse to have diseased eyes. She also visited 117 schools, with an aggregate attendance of 2,940 pupils, and reported 346 of them to be suffering with diseased eyes. The water supply of these homes consisted of 1,338 wells, 2 cisterns, and 1,453 springs. Twenty-one families depended upon polluted surface water. Of these 2,820 homes visited by this district nurse, only 414 or less than 15 per cent of them had any pretense of toilet arrangements, the remainder being reported as having "no accommodations." Of the 117 schools visited only 17 had closets that could be classed as sanitary, 38 had surface closets, while the remaining 62, or 53 per cent, had no accommodations whatever. The great majority of these homes and schools visited were remotely situated.

During the year the district nurse rode 4,094 miles on horseback to reach the homes visited. In addition to the work done by her, house to house visits were carried on from the hospitals by the doctors and other nurses at such times as they could be spared from their hospital duties.

During the year a total of 328 public-health talks were given to audiences of more than 21,000 people. Three thousand five hundred and seventy-one homes were visited, with a total population in the families of 24,982. A total of 624 schools were visited and 26,975 pupils examined. A grand total of 51,957 people were therefore reached by means of the district work. Of this number 3,666 were found to be suffering with trachoma. These district visits were used as a means of educating the people in the simple rules of hygiene, the prevention of disease, necessary procedures to be taken when ill, and practical points in caring for the sick. The old hospital cases were also followed up and advice given as to the further care of their eyes. All trachoma cases were told of the communicable nature of their disease and advised to seek relief at one of the service hospitals. A total of 11,286 pamphlets on "Trachoma, its nature and prevention," were distributed during the year.

Field clinics.—As in the past, field clinics were held as a means of carrying the prevention and eradication work into various infected localities. Preliminary to these clinics the service officer would go to the locality selected and interview the health officer and the educational authorities. He would then examine the children in the school and any others who might apply. After arranging for a temporary "hospital" in the locality, which was frequently improvised, the officer would perform operations for the relief of cases and for the instruction of physicians in attendance. When he departed a trained nurse would be placed in charge under the direction of the local physicians. The expenses of these clinics, including the care and after-treatment of the cases, were borne by the community, with the exception of the expenses of the service officer and the nurse accompanying him. As a further means of education illustrated lectures were given in the towns visited.

There were 12 such field clinics held during the year and 122 operations performed during these clinics. Of these, 77 were performed under general and 45 under local anæsthesia. A total of 145 local physicians were present at these clinics and were instructed in the diagnosis and treatment of trachoma. A number of them operated under the direction of the service officer in charge. An endeavor was always made to have the antitrachoma work continued, and permanent trachoma clinics have resulted in some of the places visited. The local physicians have adopted the methods followed by the service and conduct these clinics at stated periods.

The field clinics of the service are usually attended by representatives from the State board of health and other public-health organizations, and the interest the clinics arouse is used to promote the general public health.

An effort will be made to increase the number of these clinics during the next fiscal year.

Financial side of hospital and clinical work.—The strict economy with which this work was commenced has been adhered to. However, as the people become educated to the importance of these hospitals and the prevention of disease generally, more apply for relief and adequate provision has to be made for the increased numbers. The total cost of maintaining these five hospitals, including the increased amount of district work, was $19.50 per day each. The States of Virginia and West Virginia, however, contributed $1,800, which makes the actual cost to the service only $18.50 per day.

Importance of trachoma work.—There is no doubt that trachoma is increasing in the Appalachian Mountain region, and special effort should be made to prevent its further spread and to reach it among the school children, where it is usually incipient and readily curable.

Cases of cured trachoma, people saved to usefulness and society, are to be found in all sections of the country where this work is being done. In all of these little hospitals in the mountains and in the homes of former patients can be seen the far-reaching results of the public-health work that is being accomplished in connection with the trachoma campaign. Expectoration on the floors of the hospitals, so common at the outset, is very noticeably less. The individual drinking cup, basin, towel, toilet articles, etc., now in use, are much more appreciated than formerly.

The field, however, is extensive, the difficulties many, and this work will therefore be continued and enlarged.

TRACHOMA AMONG SCHOOL CHILDREN IN ARKANSAS.

In the course of a survey to determine the prevalence of mental defects among school children in Arkansas, made on request of the governor, the Arkansas Commission for Feeble-minded, and the State board of health (see p. 62), Asst. Surg. W. L. Treadway made inquiries into the prevalence of endemic diseases in the communities studied, notably trachoma. These investigations show a widespread distribution of the disease throughout the State and indicate that it is more prevalent in rural than in urban communities. The disease was encountered in 1.1 per cent of the boys and 1 per cent of the girls in the rural schools, and in 0.2 per cent of the boys and 0.3 per cent of the girls in the city schools.

TRACHOMA AMONG SCHOOL CHILDREN AT NOGALES, ARIZ.

In an examination of 534 school children for trachoma at Nogales, Ariz., made unofficially, Asst. Surg. A. L. Gustetter found 27 pupils with the disease, a percentage of 5.05.

PRESENT STATUS OF TRACHOMA PROBLEM.

In view of the demonstrated prevalence of trachoma, its chronicity, and marked resistance to treatment, the control of this disease is a serious problem in the United States. The measures to be taken must have a twofold object, viz., the elimination of foci of the disease and the improvement of community sanitation. Trachoma is largely a disease of insanitary surroundings, and their abolishment will depend in great measure on improving the social and economic conditions in infected communities. The bringing about of these improvements will therefore be slow, and the education of children in individual prophylaxis is essential to success. Not only should children be taught, but they should be examined regularly in schools, in order that their health and vision may be safeguarded. The care of the individual case is largely a surgical matter. These points are brought out in a short paper printed in the Public Health Reports and issued as Reprint No. 296.

TRICHINOSIS.

The recent occurrence of several outbreaks of trichinosis in the United States serves to direct attention again to this disease. In 1901 Prof. Stiles, of this service, compiled about 900 cases of the disease for this country from 1841 to 1900, inclusive, and Dr. B. H. Ransom, of the United States Bureau of Animal Industry, has brought the compilation down to 1915 by adding about 650 cases, making a total of about 1,550 cases, with 240 deaths. The States which have had the highest number of recorded cases are: New York, 355 cases, 62 deaths; Pennsylvania, 261 cases, 16 deaths; Massachusetts, 145 cases, 13 deaths; Minnesota, 101 cases, 12 deaths; California, 91 cases, 9 deaths; Illinois, 90 cases, 24 deaths.

According to results of microscopic examination by the United States Department of Agriculture more than 14 out of every 1,000 hogs slaughtered in this country contain a small parasite, known as *Trichinella spiralis*, and more than 25 out of every 1,000 of these hogs contain either this worm or bodies resembling the cysts of this worm.

If taken alive into the human body this parasite, known ordinarily as trichina, is capable of producing trichinosis, and statistics of 14,820 cases in man collected by Prof. Stiles, of this service, show that 5.6 per cent were fatal. But if the worms are killed by thoroughly cooking the pork, they will not produce this disease.

Uncertainty of microscopic inspection.—The meat inspection conducted under the Federal laws and under the regulations promulgated by the Department of Agriculture does not include an inspection for the presence of trichina in hogs. Experience shows that the microscopic inspection for trichina conducted in some countries is weakened by such an incidence of error and uncertainty that it is untrustworthy and eliminates from the trade only part of the trichinous meat. Neither meat-inspection systems nor meat dealers are in a position to give scientific assurance that pork, even if inspected microscopically, does not contain this infection. The service has therefore issued the warning that in spite of any assurance to the contrary it is not safe to eat even microscopically inspected pork unless this has been thoroughly cooked or treated by some other safeguarding process that kills the trichinæ.

TYPHOID FEVER.

EPIDEMIC AT GALLUP, N. MEX.

Study of an epidemic of typhoid fever at Gallup, N. Mex., during September and October, 1915, was made by Surg. F. C. Smith, on directions from the bureau. It was determined that the epidemic, which was mild in character, was almost certainly caused by milk infection. A flood occurred early in September, washing out of the river bed the accumulated sewage of several weeks, which was carried to a farm below furnishing milk to the city. Of 65 cases in which the epidemiological data were fairly clear, 61 gave a history of having taken milk from this farm, either as a beverage, on cereal, or in milk or malted milk shakes at a soda fountain. The large number of children in this series of cases—41 under the age of 18—would at once suggest the probability of milk infection, were other facts concerning the milk supply unknown.

It was not determined where the preepidemic cases received infection, but it is thought probable that typhoid fever was constantly present in the city from midwinter to September 5, the date of the flood, and that the sewage delivered into the river was contaminated with typhoid bacilli. The explosive outbreak which occurred September 18 fulfilled the conditions imposed by the incubation period of the disease, which is from 8 to 21 days.

During the investigation, studies of the water supply and other conditions possibly affecting the epidemic were made. A report recommending a course to be pursued to prevent a recurrence of the epidemic was made to the mayor of Gallup and published in the Public Health Reports of January 14, 1916.

SURVEY OF ORIGIN OF TYPHOID-FEVER CASES.

In connection with the study of the pollution of coastal waters, Surg. H. S. Cumming made inquiries into the origin of a series of outbreaks of typhoid fever in Illinois, Indiana, Pennsylvania, and New York, as a result of which insanitary conditions were found in various shellfish shucking houses. (See p. 77.)

Typhus Fever.

INVESTIGATION OF CASE IN BALTIMORE, MD.

On September 3, 1915, Asst. Surg. M. H. Neill was directed to proceed to Baltimore for conference in relation to a suspected case of typhus fever. In view of a characteristic clinical picture, especially the exanthem, and the fact that other affections of a similar appearance could be ruled out, it was concluded that the case was one of typhus fever, in spite of the lack of any history of near or remote contact with preceding cases of typhus fever which have occurred in Baltimore.

The above case emphasizes the liklihood of the undue prevalence of typhus fever in our large centers of population. Investigations had previously shown that the disease had prevailed for many years in one such center, the disease being recognized under another name. While no great spread of the infection is to be expected, it is evident that physicians and sanitarians should be on the lookout for such cases.

Occupational Diseases and Industrial Hygiene.

Investigations of occupational diseases and the hygiene of workers during the past fiscal year, under the general direction of Surg. J. W. Schereschewsky, have been somewhat extended. In conformity with the policy of establishing public-health stations in various sections of the United States, the field headquarters were transferred to Pittsburgh, Pa., during July, 1915. It seemed fitting that field headquarters devoted to this purpose should be established in a large industrial center.

In order to provide facilities for research work suitable laboratories have been established in the Pittsburgh Marine Hospital. The clinical laboratory, consisting of a room 16 by 25 with two adjoining rooms each 12 by 12, was converted into a physical laboratory for the purpose of making studies of the hygiene of illumination. The laboratory has been provided with apparatus for this purpose.

On the second floor of the hospital one room, 65 by 28 feet, was converted into a series of laboratories—bacteriological, physiological, and chemical, respectively—for the purpose of studying problems relating to occupational diseases and industrial hygiene involving these lines of research.

EFFECT OF GAS-HEATED APPLIANCES UPON AIR OF WORKSHOPS.

During the past fiscal year the work of investigating the effects of certain gas-heated appliances upon the air of workshops was completed. This work was incidental to a study of the health of garment workers, undertaken at the solicitation of and in cooperation with the joint board of sanitary control of the Cloak and Suit and Dress and Waist Trades of New York City. The results of this study were published in Public Health Bulletin No. 71. As the use of gas-heated pressing irons is general in the women's garment industry it became desirable, during the course of the general investigation just mentioned, to study the extent to which garment workers as a class, and pressers in particular, are exposed to the health hazards incident to the use of gas-heated pressing appliances.

This study was made by Sanitary Chemist Charles Weisman, under the general direction of Surg. J. W. Schereschewsky. The laboratory work was done in the chemical laboratories of Cornell Medical School, through the courtesy of the faculty of the medical school.

The general scope of this investigation was as follows:

1. Analyses of air samples taken in shops of the garment industry with reference to the amount of carbon monoxid gas present and studies of the condition of gas-heated appliances.
2. Laboratory examinations of the gaseous combustion products of various kinds of gas-heated pressing irons.
3. Tests of the permeability to gas of the walls of various kinds of flexible gas tubing and of the security against leakage of gas connections.
4. The hygienic significance of the presence of small amounts of carbon monoxid in the air of confined inhabited places.

Analyses of air in workshops.—During the course of the study air samples were obtained from 244 shops of the women's garment trades. Two samples were taken on each occasion, one from the vicinity of pressing irons, the other from a situation near a window as far removed as possible from sources of air contamination.

In 29 shops, or 11.8 per cent of the total number, the amount of carbon monoxid present in the vicinity of pressing irons was over

100 parts to the million of air. The average amount of carbon monoxid present in these shops was 325 parts to the million of air, the maximum being 1,431 parts, while the minimum was 105 parts. Of the samples taken in these shops near windows, at points as far away as possible from sources of contamination, the amounts of carbon monoxid present ranged from 2 to 39.6 parts per million of air, or an average carbon-monoxid content of 11.8 parts per million.

It is evident from the figures just given that the contamination of the air of the shops examined was significant only in the vicinity of pressing irons. Pressers, therefore, are the group of garment workers particularly exposed to the hazard of chronic poisoning by carbon monoxid. In considering the results of the air analyses, however, it should be considered that this study was made during the open-window season, when nearly all the shop windows were open. In the shops studied there was very little attempt to provide any aids to natural ventilation. No mechanical exhaust system was used in any of the shops visited. Electric fans were provided in only 6 per cent of the shops inspected. Less than one-half of such places used the fans. An odor of gas was perceptible in 93 establishments, or in 38 per cent of the total number. Of 29 shops in which the amount of carbon monoxid present exceeded 100 parts per million, an odor of gas was present in 27.

In many instances defective tubing was found conveying gas to pressing irons. Such defective tubing was found in 66 shops, or in about 27 per cent of the total number. Of the 244 shops studied, 122, or 50 per cent, used ordinary gas irons only; 102 shops, or 41.8 per cent used "blower" irons exclusively, while the rest used miscellaneous irons.

That the amounts of carbon monoxid found in the air of workshops were not fortuitous was shown by the results of reinspections. In some instances the amounts of this gas found at a second visit exceeded that present at the first examination.

The sources of carbon monoxid in the air of workshops of the women's garment industry were found to be:

(*a*) Defective combustion of gas in pressing irons.

(*b*) Diffusion of illuminating gas through the walls of gas hose not visibly defective.

(*c*) Leakage from defective gas connections and defective gas hose. These three sources of the contamination of air with carbon monoxid were therefore investigated.

Combustion products of pressing irons.—Two general types of gas pressing irons are in general use in the women's garment trades, (1) pressing irons burning a mixture of gas and air at atmospheric pressure and (2) pressing irons in which the gas and air mixture is supplied under pressure by means of blowing apparatus. Consideration of the construction and analyses of the combustion products of the atmospheric iron in many instances showed that the combustion of the gas-and-air mixture is defective. In one instance 2 per cent of carbon monoxid was found in the combustion products of one type of atmospheric iron, while the average for eight different makes was 0.57 per cent. The combustion products from an improved type of atmospheric iron and those from properly adjusted "blower" irons failed to show the presence of carbon monoxid in significant amounts, although small quantities were present.

Permeability of walls of gas tubing and gas connections to illuminating gas.—Some 68 tests were made of the permeability to illuminating gas of the walls of gas hose.

The results of these tests show, (1) that none of the tubing tested was found to be perfectly gas tight, (2) that the permeability of new tubing is increased if gas be passed through it for a certain period (30 to 60 hours) before making the test, (3) that rubber tubing is the least permeable to gas, and, finally, (4) that the walls of flexible metal tubing and "composition" tubing give considerable leakage of illuminating gas.

The rubber ends used to connect gas hose with gas irons and with sources of gas supply were found to be prolific sources of gas leakage. Laboratory tests made upon new connections showed that these were by no means gas tight. In practice, the heat generated by gas irons, as well as the constant to-and-fro motion to which they are subjected causes these connections, too frequently made of scrap rubber and possessing but little inherent elasticity, to expand and to lose the little elasticity originally present so that considerable quantities of illuminating gas escape into the air. The ends also frequently become loosened or entirely detached from the gas tubing, thus leading to crude and ineffectual attempts on the part of the user to make them gas tight by bandaging with tape, rags, and the like.

Hygienic significance of small amounts of carbon monoxid.—It was evident from the foregoing studies that the opportunities are numerous for the contamination of the air of workshops of the women's garment trades with carbon-monoxid gas, and that pressers must frequently be exposed to the risks of chronic poisoning. This gas possesses such affinity for the hemoglobin of the blood that even small quantities in the air of interiors may be detrimental to health. While we are, as yet, without exact standards as to the minimum amount of carbon monoxid which may be present, without causing harmful effects, in the air of interiors, it is probable that quantities of this gas in excess of 200 parts per million of air exert a deleterious influence upon those continuously exposed to such atmosphere. Carbon monoxid in excess of the proportions just given was found present in a number of instances in the air of the workshops studied.

Freedom from the hazard of carbon-monoxid poisoning due to the use of gas-heated pressing irons can be secured only by the use of approved types of gas irons, carefully selected rubber tubing, gas-tight connections, and a well-devised system of frequent inspection and constant maintenance. The hazard of chronic carbon-monoxid poisoning may be eliminated by the use of electrically heated pressing irons.

The results of this investigation are being published as Public Health Bulletin 81.

RELATION OF HEALTH OF GARMENT WORKERS TO ECONOMIC STATUS.

Data obtained in the investigation of garment workers in New York City were analyzed by Surg. B. S. Warren and Public Health Statistician Edgar Sydenstricker in a paper printed in the Public Health

Reports and issued as Reprint No. 341. The conclusion reached was that the greatest number of poorly nourished, anemic, and tuberculous workers were in that group composed of the lowest paid and the least regularly employed.

ILLUMINATION IN GOVERNMENTAL DEPARTMENTS.

Photometric surveys.—During the fiscal year the studies begun during the previous year of the hygienic aspects of illumination in relation to occupation and to vision of workers were continued. Photometric surveys of large Federal buildings in Washington, D. C., were undertaken and completed. These surveys covered the Treasury Building and the Bureau of Printing and Engraving. The results of this survey are now being compiled.

Studies of vision.—These studies were conducted as part of the illumination survey. The Federal bureaus mentioned contain a large body of employees who perform exacting eye work. In addition to investigating the conditions of illumination, it was thought that a study of the ocular conditions present in the workers concerned should yield instructive data. Accordingly Surg. G. L. Collins was detailed to make the studies in question. A room in the Treasury Building was fitted with the necessary equipment to make complete eye examinations. Representative groups of employees from the Treasury Department, the Bureau of Printing and Engraving, and the Government Printing Office have been carefully examined as to their ocular status. Records of the visual examinations of about 1,000 individuals have been collected so far.

A large number of varieties of close eye work are represented, such as proof reading, engraving, bill counting and sorting, adding machine operation, and clerical work of various kinds. For comparative purposes, groups of persons not subjected to eyestrain, such as laborers and elevator operators, have also been included among those examined.

HEALTH CONDITIONS SURROUNDING EMPLOYMENT OF WOMEN IN WISCONSIN.

Purpose of investigation.—The laws of the State of Wisconsin provide that the hours of labor for women in that State shall be such as not to prejudice their safety or welfare. The industrial commission of the State is charged by law with the duty, after due investigation, of fixing the hours of labor in women-employing industries so as to comply with the fundamental principle expressed in the State law in regard to these hours.

The Industrial Commission of Wisconsin requested the cooperation of the Public Health Service in making an investigation of the health conditions surrounding the employment of women in that State in order to obtain data upon which the hours of employment of women might be satisfactorily fixed. Passed Asst. Surg. Robert Olesen was detailed to make this study under the general supervision of the officer in charge of field investigations in occupational diseases. Work was begun in November, 1915, and has been steadily continued since that time.

Scope.—So far, the scope of this study has been as follows:

(1) A general survey of all the women-employing industries in the State, with a view to gaining an idea of the sanitary conditions surrounding women employed in industries, their hours of employment, and the health hazards to which they are exposed.

(2) A study of the total sanitary environment of working women, together with the collection of data as to their intimate personal and industrial histories, the time lost through illness and other pertinent information relating to health.

(3) Detailed studies of the fatigue curve and hourly production in typical operations and processes in women-employing industries.

(4) Comparative studies of the fatigue curves, hourly, daily, and weekly production in industrial establishments employing women 8 hours and 10 hours daily, respectively.

(5) Collection of data as to the effect of defective sanitary conditions in the causation of fatigue. These data include the effects of excessive temperature and humidity, defective illumination, and similar unhygienic conditions.

General survey.—The general survey of women-employing industries comprised a study of 141 establishments covering practically every industry using female labor in the State. This survey served to gain an excellent idea of the general industrial environment, the hours of labor, and the sanitary status of the establishments studied.

Environment of female workers.—The study of the total environment of female workers and the collection of intimate personal and industrial histories has been conducted by a special field investigator, under the supervision of Passed Asst. Surg. Olesen. The object of this portion of the study is to determine the influence upon the health of female workers, of the environment outside the shop, the character and amount of their nourishment, the morbidity incident to their employment, the effect of the menstrual epoch, the amount of daily rest required by various individuals in order to secure complete recuperation from the fatigue of the day, the time available for recreation and personal improvement, the time spent in performing additional domestic duties, their nature and extent, and similar data of service in evaluating the total stress laid upon women occupied in industries under conditions as they exist in the State.

Fatigue curve.—The special detailed studies of the fatigue curve, as exemplified by the study of the hourly production, have been undertaken with a view to investigating the fatigue incident to the day's work. Data of several kinds are being collected, as follows:

(1) A record of the production throughout each hour of the day in order to study the onset of fatigue; to determine if, in the operations studied, there is evidence of cumulative fatigue throughout the week; the period of time during which the worker is (*a*) active, (*b*) attentive but not actively productive, (*c*) the amount of idle (nonproductive) time; the effects of certain variables upon the production (a list of some 20 has been compiled); the effects of heat, humidity, the weather conditions of illumination; and the menstrual epoch upon production and consequent fatigue.

(2) Comparative studies in similar operations of the effects of an 8-hour and of a 10-hour day, respectively, upon the production.

In making these fatigue studies Passed Asst. Surg. Olesen has been assisted by seven special female field investigators. It is thought that the data already collected are of considerable value. It is hoped, as a result of these studies, that a substantial contribution will be made to the difficult task of determining intelligent criteria by which to regulate the hours of labor for women and thus to promote their health and efficiency.

STUDY OF HEALTH OF STEEL WORKERS.

Through the courtesy of the Carnegie Steel Co., of Pittsburgh, Pa., permission was obtained to make a detailed study of the effects of occupation in the steel industry upon the health of workers. This study is being conducted at a large steel plant in the vicinity of Pittsburgh. The general methods of investigation pursued have been similar to those in the investigation of the health of garment workers. (See Public Health Bulletin No. 71.)

The investigation embraces the following points:

(1) Careful physical examination of representative groups of steel workers.

(2) Collection of social and economic data.

(3) Detailed survey of places of employment within the plant.

(4) Detailed studies of certain processes and operations.

An examination room was placed at the disposal of the service by the steel company. All the examinations have been voluntary, the objects of the investigations having been previously explained to the workers. The work has been carried on by Surg. J. W. Schereschewsky, in general charge, by Surg. G. L. Collins, who made a study of the eye conditions prevailing among steel workers, and by Passed Asst. Surg. J. A. Watkins, Asst. Surg. H. F. Smith, and Scientific Assistant V. A. Williams. By the close of the fiscal year complete physical examinations had been made of about 925 steel workers. The data collected promise to be interesting and valuable.

A PLAN FOR EDUCATION IN INDUSTRIAL HYGIENE.

A plan for cooperation between private agencies and Federal, State, and local authorities in the education of the worker in industrial hygiene and in the avoidance of occupational complaints was prepared by Surg. J. W. Schereschewsky and presented in an article published in the Public Health Reports and issued as Reprint No. 302. Information is to be disseminated by: (1) Permanent exhibits; (2) traveling exhibits, including moving pictures; (3) popular lectures; (4) bulletins issued for popular distribution by Federal, State, and local health authorities and by private associations; (5) popular articles published by the press; and (6) instruction in public schools.

COOPERATION WITH PENNSYLVANIA STATE DEPARTMENT OF LABOR AND INDUSTRY.

Relations with the State Department of Labor and Industry of Pennsylvania have been entered into on a basis of mutual cooperation. Assistance will be reciprocally given by the Federal and State Governments in the making of various studies for the improvement of industrial hygienic conditions generally. The results of such mutual cooperation should be valuable.

MINE SANITATION.

Investigations of the occupational diseases of the mining industry and of mine sanitation, conducted in cooperation with the United States Bureau of Mines, were continued during the last fiscal year.

Studies in Joplin (*Mo.*) *district.*—The investigation of the prevalence of tuberculosis among the miners of the Joplin district, southwestern Missouri, begun in November, 1914, was terminated in December, 1915. Passed Asst. Surg. A. J. Lanza made final reports on this investigation, embodying the status of mine sanitation, the prevalence of pulmonary diseases among the miners, and their housing and living conditions. Silicious rock dust in the underground workings was shown to be responsible for miners' consumption, which in turn contributed to the morbidity from tuberculosis. The report to the Public Health Service will be published as Public Health Bulletin No. 85.

Miners' consumption—silicosis—its prevalence and its relationship to tuberculosis were carefully studied. More than 700 miners were examined; of these 60 per cent showed injury of the lungs due to the inhalation of silicious dust, 14 per cent being also tuberculous, as far as could be determined by physical examination and laboratory methods. Five per cent were tuberculous, but in them there could be demonstrated no connection between the disease and their occupation. While the percentages quoted do not imply a similar percentage of the whole body of miners in the Joplin district, it was concluded that about 35 per cent of the whole were affected with silicosis.

The investigation at Joplin demonstrated that miners' consumption is an important occupational disease of the metal-mining industry in this country. Men exposed constantly to silicious dust for five years were fairly certain to be found in the first stage of silicosis, and an average of the records of 28 deaths indicated that the victim of miners' consumption may be expected to die within 10 years of beginning exposure to silicious dust. The danger from silicosis is increased by the fact that its victims practically always become tuberculous; tuberculous infection may occur when the silicosis is slightly advanced, moderately advanced, or far advanced. While the percentage of tuberculosis increases with the progress of the silicosis, apparently such infection is becoming more and more prevalent in the early stages of silicosis in proportion as unfavorable living and housing conditions increase the number of tuberculous foci in the community.

The office of the Public Health Service in Webb City was continued until the end of the investigation. With the assistance of a visiting nurse records of housing conditions were obtained and laboratory specimens secured. As much educational work as possible was done; every man examined was informed as to his condition and, if diseased, advised how to take care of himself and safeguard his family. Living and housing conditions were found to be generally below the standard of what might be expected from the wages received by the miners. Not poverty, but a failure to appreciate better standards, appears to be a primary cause of poor living and housing conditions.

Through the generosity of the local association of mine operators (the Southwest Missouri Mine Safety and Sanitation Association) and the Jasper County Antituberculosis Society a tuberculosis dispensary was established in May, 1916, in the center of the mining district, with a salaried physician and three visiting nurses of the staff in constant attendance. One day a week is devoted to miners' children. Legislation was enacted providing for a county sanitarium for consumptives, bonds were voted for it, and its erection is now under way.

An examination of school children to the number of 2,500 was made. The results did not indicate much tuberculous infection of miners' children, but the danger of such infection is nevertheless apparent.

As a result of the activity of the United States Public Health Service and the Federal Bureau of Mines, there has been a very great improvement in underground conditions in the Joplin district; the hearty cooperation of mine owners, miners, mine inspectors, and others interested has been the biggest factor in this improvement. The maintenance of a tuberculosis dispensary for adults and children by the community promises equally well for the improvement of surface conditions.

Studies in Butte (Mont.) district.—In May, 1916, there was begun an investigation of the prevalence and causes of miners' consumption and tuberculosis in the Butte district, Montana. This investigation is still under way, its scope embracing both underground and surface (living) conditions.

SANITATION OF STEEL PLANTS.

The investigation of existing hygienic conditions of places of employment in the metallurgical plants of the Pittsburgh district, being conducted by Passed Asst. Surg. J. A. Watkins in cooperation with the Bureau of Mines, was concluded during the year. General surveys of the industry as a whole having been completed, intensive studies of certain conditions which might injuriously affect the health of the steel workers were made and certain manuscripts prepared, including a popular one on the avoidance of health hazards published by the Bureau of Mines.[1]

Carbon-monoxid poisoning.—Among the health hazards studied was that of chronic carbon-monoxid poisoning. Air samples taken in working locations contained on an average a sufficient amount of this toxic gas to indicate that chronic carbon-monoxid poisoning was a serious health hazard of this industry and one demanding immediate attention. Accordingly, an intensive study was instituted and recommendations made as to the best means of mitigating this hazard.

Dust hazard.—A number of air samples were also taken in working locations to determine the amount of dust suspended in the air. It was found to be excessive in several places. The physical and chemical nature of these dusts was studied to determine the effect they might have upon those exposed. A large number of photomicrographs were taken and chemical analyses made. A study was also made of conditions which brought about the suspension of these dusts, and ways and means by which they could be eliminated or minimized were devised.

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[1] Technical Paper 102. Health Conservation at Steel Mills. By J. A. Watkins.

Heat hazard.—During the preliminary work of this survey a large amount of data were collected regarding the exact conditions of temperature and humidity to which steel workers are exposed. Studies based on this data were instituted with a view to determining means of mitigating this health hazard.

Drinking-water facilities.—Intimately related to the foregoing is the problem of furnishing drinking water in a satisfactory manner to those employed in this industry. A study was made of the requirements of the steel workers and of the problems to be overcome in connection with installing drinking-water systems.

Hazards of illumination.—Another feature of the steel industry studied was the exposure of workers to various industrial lights of great intensity, accompanied in many instances by marked contrast, and to lights which have been suspected of injuriously affecting the eyes because of their spectral composition. Data and information were collected in order to determine the length of time to which steel workers must of necessity be exposed to these industrial lights while carrying on their duties, the precautions taken by the employers to protect the employees, and the precautions taken by the steel workers themselves to the same end. With the assistance of Assistant Physicist D. H. Tuck photometric readings were taken of the various industrial lights of this industry during the various stages of the manufacturing processes in which they occur. As a result of these studies valuable data were collected which will aid those in this industry concerned in mitigating the industrial-light hazard.

A survey was also made of several plants in order to determine the systems of illumination at present installed. The particular needs of the workers in this industry in regard to illumination were taken up, and ways and means were considered by which the present system could be improved. Installation of a system of artificial illumination in a steel plant is attended by many difficulties, and the most efficient system must of necessity be determined as a result of some experimentation. Means by which this can be accomplished are now under consideration.

Medical-relief stations.—As the medical relief afforded the employees in an industrial establishment is a very important factor in the maintenance of the health of the employees, a study was made of existing medical-relief systems in this industry and the particular requirements which should be fulfilled by such a system. As a result of these studies data were collected which made possible certain recommendations regarding the organization and operation of a medical-relief system in a steel plant, including construction and equipment of an emergency hospital, first-aid work, and instruction about the plant, medical supervision of employees, plant sanitation, industrial hygiene, and related subjects.

HEALTH INSURANCE.

The investigation of health insurance begun in cooperation with the Commission on Industrial Relations has been continued independently by Surg. B. S. Warren during the past fiscal year. He has had the assistance of Edgar Sydenstricker, public health statistician. Information and data have been collected along the lines previously reported and special attention has been paid to studies of the economic aspects of the problem of the health of wage earners.

In addition to the foregoing, a review of health insurance plans in this country is being made as an aid in the consideration of health insurance from a public-health standpoint.

Survey of health insurance in relation to the public health.—During the year a part of the results obtained in this investigation was published as Public Health Bulletin No. 76, "Health Insurance: Its Relation to the Public Health." The bulletin presents briefly the need for more adequate measures for the relief and prevention of sickness among the wage-working population, especially among the unskilled, low-paid group, and suggests a governmental health-insurance system as a remedy worthy of careful consideration in this connection. It is emphasized that such a system should be based squarely upon the fact that all three groups—worker, employer, and public—are responsible in varying degrees for the conditions causing disease, and should therefore share in the efforts to improve them. The conclusion reached is that a health-insurance system would not so much introduce ideas and practices new to this country as it would utilize existing plans and principles in a more effective way. The real problem is declared to be one of organization.

Coordination of health insurance system with health agencies.—Further investigation of the operation of existing forms of health insurance will be made in order to determine the relation that should be borne by existing health agencies to any proposed health-insurance laws. It is believed that the United States should avoid the mistakes which foreign countries have made in not making proper provision for correlating health-insurance agencies with other health agencies. As yet, however, none of the legislative measures proposed has contained anything more than provisions for the relief of sickness. It may be that the provision for the support of the insurance funds by contributions from employers, employees, and the State will create a continuous economic pressure to reduce these contributions by preventing sickness; but no machinery has been provided which may be used by the groups feeling this economic pressure to prevent sickness. In view of the possibility of the failure to include disease-preventing provisions in the laws, health officials should cooperate with those framing health-insurance measures.

In this connection special consideration should be given to the report on health insurance adopted by the fourteenth annual conference of State and Territorial Health Officers with the United States Public Health Service, held in Washington May 13–15, 1916. This report summarizes the fundamental provisions which on the basis of the present investigation it has been concluded should be embodied in any health-insurance measure proposed for National or State Governments.[1]

Increase in interest in health insurance.—During the year there has been increasing interest in the subject of health insurance on the part of the public, employers, employees, and the medical profession. The committee on social insurance of the American Association for Labor Legislation has drafted a model bill, slightly modified forms of which have been introduced in several State legislatures. The Legislatures of California and Massachusetts have passed laws providing commissions for the investigation of the subject. A resolution providing for a national commission for study of the subject has been favorably reported in the House of Representatives. In addition, various national organizations, including the American Medical Association, have appointed committees for the study of the various features of health insurance. In view of this active interest there is reason to believe that the enactment of health-insurance laws will eventually follow.

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[1] Reprint 352 from Public Health Reports.

Statistics of disability.—In connection with the investigation of health insurance statistics of disability in the United States have been compiled by Surg. Warren and Mr. Sydenstricker and published in the Public Health Reports, being issued as Reprint No. 335.

STUDIES OF CHILD-LABOR PROBLEMS IN MASSACHUSETTS IN RELATION TO HEALTH.

In January, 1915, on request of the Massachusetts Child Labor Committee and the Massachusetts State Board of Labor and Industries, Asst. Surg. M. V. Safford was instructed to cooperate with these agencies in studies of the influence of occupations on the health of persons during the period of adolescence, with the view to standardizing methods of oversight of such persons in order to protect their health in the industries. More efficient methods for determining the physical fitness of children to engage in given occupations and the matter of vocational selection in general were also considered.

The cooperation requested is still being continued by Dr. Safford. In connection with his work with the Massachusetts Board of Labor and Industries possible occupational hazards for minors in various industries have been investigated, changes in existing methods of examining for employment certificates and changes in present practices in issuing such certificates have been recommended, a study of the effect on minors of employment in the cotton-manufacturing industry has been completed, and preparations have been made for a similar investigation of the rubber-manufacturing industry of the State.

In the investigation of the cotton industry, the mechanical and chemical processes, the working conditions, and the actual physical condition of employees themselves were considered. For the last-named purpose there were subjected to careful physical examinations about 700 boys between the ages of 14 and 18 years. These boys were employed in 49 different kinds of work in the mills. They represented practically every race or nationality to be found employed in the industry in the State. Establishments were selected for investigation so as to secure employees for examination in mills of both old and modern construction in every cotton-manufacturing locality in the State. In each mill selected every male employee under 18 years of age was examined.

Among the inferences to be drawn from this investigation are the following: Diseases and defects of a more serious character are less common among minor cotton-mill employees in Massachusetts than in the general school population of the same ages. In a measure at least this fact is to be credited to the Massachusetts requirements as to the issuance of employment certificates. Defects of a minor character are, however, very common, and in average physical development, with the exception of those between the ages of 15 and 16, the boys compare unfavorably with boys of the same ages in the general population. To a great extent the cotton mill represents a transitory employment for boys who are too young or too deficient in physical strength to do harder work. Apart from some possibly unfavorable effects of atmospheric conditions and noise, the occupational hazards of the industry are few. Whatever may be the possible effects of the occupation or working conditions, they are apparently relatively unimportant in comparison with bad heredity, bad home conditions, bad habits, and the sequelæ of acute diseases of childhood in accounting for the physical defectiveness disclosed by the investigation. The results of this investigation were published as Public Health Bulletin No. 78.

PUBLICATIONS.

Of the publications of the service during the past year the following referred to occupational diseases and industrial hygiene:

PUBLIC HEALTH BULLETINS.

73. **Tuberculosis Among Industrial Workers.** Report of an Investigation Made in Cincinnati, with special reference to predisposing causes. By D. E. Robinson and J. G. Wilson. March, 1916.
76. **Health Insurance.** Its Relation to the Public Health. By B. S. Warren and Edgar Sydenstricker. March, 1916.

REPRINTS FROM PUBLIC HEALTH REPORTS.

302. **Industrial Hygiene.** A plan for education in the avoidance of occupational diseases and injuries. By J. W. Schereschewsky. October 1, 1915.
335. **Statistics of Disability.** A compilation of some of the data available in the United States. By B. S. Warren and Edgar Sydenstricker. April 21, 1916.
341. **Health of Garment Workers.** The Relation of Economic Status to Health. By B. S. Warren and Edgar Sydenstricker. With introduction by J. W. Schereschewsky. May 26, 1916.

SANITATION OF CONVICT CAMPS.

At the request of the Director of the Office of Public Roads, United States Department of Agriculture, the cooperative studies of convict camps have been continued throughout the fiscal year.

In order that the practicability of establishing and maintaining a convict camp under strictly sanitary conditions might be demonstrated, a cooperative plan was carried out with the above-mentioned office and the officials of Fulton County, Ga. Passed Asst. Surg. W. F. Draper was placed in general supervision of the sanitary work and devoted the time necessary in addition to his regular duties.

As a result of these studies it is believed not only that it is possible to maintain convict camps strictly in accordance with sanitary principles, but that the reduction in the sick rate, the improvement in the morale, and the increase in the general efficiency of the men make a sanitary camp an economic necessity.

The data in regard to the demonstration camp will be embodied in a report which will be published upon completion of the study.

Public-Health Organization and Administration.

Studies of public-health organization and administration in States and cities have been continued, in cooperation with State and local health authorities, and detailed reports have been published. Such studies have so far related to the States of Florida, Illinois, Kansas, Maryland, Massachusetts, Minnesota, Nebraska, Nevada, North Dakota, Washington, and West Virginia, and the cities of Baltimore, Md., Bowling Green, Ky., Chicago, Ill., Columbia, S. C., Richmond, Ind., St. Joseph, Mo., Toledo, Ohio., Youngstown, Ohio, and Winston-Salem, N. C. In addition exhaustive compilations and analyses have been made of the legislation relating to this subject.

The information thus obtained, as was stated in the last annual report, seems to justify the conclusion that the two greatest sanitary needs of the Nation at the present time are: (1) Employment of properly qualified, full-time health officers for every community; (2) appropriations sufficiently large to conduct efficient health work. It would appear that at least 2 per cent of the public revenue should be spent for public-health work. In fact, in most of the States the need is not so much for more health laws as for coordination of those already on the statute books, grouping of direct health functions under one executive officer, and adequate funds to enforce existing legislation.

PUBLIC-HEALTH ADMINISTRATION IN NEVADA.

An investigation of public-health administration in Nevada was made by Surg. Carroll Fox from July 22 to August 21, 1915, and included a study of the health organizations of eight towns in seven counties: Reno and Sparks, in Washoe County; Elko, Elko County; Winnemucca, Humboldt County; Goldfield, Esmeralda County; Tonopah, Nye County; Carson City, Ormsby County; and Virginia City, Storey County.

As a result of this study Dr. Fox reached the conclusion that a well-organized department of health, to strengthen the present board of health and to correlate the various public-health activities which are now being carried on by different State organizations, is an essential in Nevada. Recommendations were made to bring about this change in an effective manner. These, together with a complete discussion of the investigation, were published in the Public Health Reports and issued as Reprint No. 317.

PUBLIC-HEALTH ADMINISTRATION IN NORTH DAKOTA.

From September 17 to November 3, 1915, Surg. Fox carried on a similar investigation of public-health organization and administration in the State of North Dakota. As a result it was concluded that there is a great lack of organization and funds with which to carry on public-health work in this State. Such health measures as have been enacted, Dr. Fox found, are more or less scattered among different branches of the government, whereas all these measures should be coordinated and their enforcement imposed on a single State health organization. To bring about such coordination Dr. Fox, in a report published in the Public Health Reports and issued as Reprint No. 315, made necessary recommendations to the State authorities.

PUBLIC-HEALTH ADMINISTRATION IN FLORIDA.

A survey of the public-health organization and administration in Florida was made by Surg. Fox from November 28, 1915, to February 28, 1916. As a result of this study it was concluded that the State board of health was engaged in many important activities, but that certain changes are desirable in order to increase efficiency and to secure quicker and more certain results.

In Reprint No. 340 from the Public Health Reports, Dr. Fox gives the results of his investigation and includes detailed recommendations covering the needs of the State health organization. The report deals with the State board of health, the executive division, including State health officer, the registration of births and deaths, the notification and control of diseases, diagnostic laboratory, the field force, the division of public health engineering, publications, exhibits, health supervision of schools, the veterinary division, control of the milk supply, the treatment of crippled children, hotel inspection, abatement of nuisances, licensing of embalmers, and receipts and expenditures.

In the course of the investigation Jacksonville, Tampa, Pensacola, Miami, Key West, St. Augustine, and Tallahassee were visited and their health administration inquired into.

PUBLIC-HEALTH ADMINISTRATION IN NEBRASKA.

From March 11 to May 1 Surg. Fox conducted an investigation of public-health organization and administration in Nebraska, the results of which were published after the close of the fiscal year (Reprint 348 from the Public Health Reports). The studies were made along the lines of those reported above, and similar recommendations prepared. These recommendations provide for an adequate organization for carrying on the public-health work immediately required and for additions to this organization in the future.

During the course of the study the following places were visited: Omaha, Lincoln, Grand Island, Hastings, North Platte, Kearney, Seward, Columbus, and Ashland.

PUBLIC-HEALTH ADMINISTRATION IN COLUMBIA, S. C.

A study of public-health organization and administration in Columbia, S. C., was made by Senior Surg. J. C. Perry from September 9 to November 1, 1915, and a report with recommendations submitted to the State and local health authorities. The appointment of a full-time health officer, whose tenure of office should depend on efficiency, was recommended.

Immediately after the survey, steps were taken by the local authorities to obtain a full-time health officer and to carry out many of the other recommendations contained in Dr. Perry's report.

PUBLIC-HEATH ADMINISTRATION IN ST. PAUL, MINN.

On request of the State and local health authorities, Surg. George B. Young was detailed on April 3, 1916, to make an investigation of the public-health organization and administration of St. Paul, Minn. The investigation continued for over two months. It was found that the present city charter does not permit St. Paul a central health agency of adequate scope, and that the existing charter powers regarding matters affecting the public health have not been sufficiently utilized. A full-time health officer was recommended. When completed the report of this investigation will be furnished to the city authorities.

PUBLIC-HEALTH ADMINISTRATION IN MINNEAPOLIS, MINN.

During the same period Surg. Young made a study of the public-health organization and administration of Minneapolis, Minn. Among other things, Dr. Young found that the system of controlling communicable diseases was defective in plan, that there was no proper system in effect for utilizing the general morbidity and mortality records as a basis for departmental activity, and that there was a lack of supervision of the sanitary food and dairy inspection. When completed the report of this investigation will be furnished to the city authorities.

PUBLIC-HEALTH ADMINISTRATION IN YOUNGSTOWN, OHIO.

From May 15 to July 1, 1916, Surg. Fox made a study of public-health organization and administration in Youngstown, Ohio. A report of this investigation was published in the Public Health Reports and issued as Reprint No. 365. As in the other studies of public-health administration detailed recommendations were made on the basis of information obtained in this and in other public health administration investigations. These have to do with the subdivision of the work of the health department, personnel, expenditures, supervision of the milk supply, and other public health problems.

SANITARY SURVEY OF RICHMOND, IND., WITH SPECIAL REFERENCE TO TUBERCULOSIS.

The survey of sanitary conditions in Richmond, Ind., with special reference to tuberculosis, which was commenced in the fiscal year 1915, was completed during the last fiscal year and a report of it published as Supplement 26 to the Public Health Reports. Senior Surg. J. C. Perry, who made the investigation, found that the prevalence of tuberculosis did not differ materially from the incidence of this disease in similar cities in the same geographic location. As has been noted in all other investigations of this subject, a large proportion of the cases occurred where housing conditions were unsatisfactory and among the less financially able.

Dr. Perry's recommendations included phases of the subject of public-health organization and administration.

SANITARY SURVEY OF WINSTON-SALEM, N. C.

From May 2 to 8, 1915, a sanitary survey of Winston-Salem, N. C., with reference to excreta disposal was conducted by Prof. C. W. Stiles, of the Hygienic Laboratory. It was found that the sanitary conditions of this city in regard to excreta disposal are not unusual, but are complicated by such factors as the rapid growth of the city from rural to urban demands and the presence in the laboring population of a large number who were not in the habit of remaining long in one city.

Among the recommendations made were those for the establishment of a license privy system, with uniform-sized cans, to be supplanted later by the extension of the present sewerage system through the whole city, and for a full-time health officer and increased personnel and expenditures, pending the combining of the city and county health authorities into one body.

SANITARY CONDITIONS OF HOPEWELL, VA.

A sanitary survey of Hopewell, Va., was made during the year by Sanitary Engineer Leslie C. Frank. This survey was of peculiar interest in view of the nature of the growth of Hopewell, which has been rapid and due almost entirely to the establishment in September, 1914, of a large branch of the ammunition plant of a large powder-making company. Up to February, 1916, the sanitary conditions of the town were supervised by the company; but at that time the State legislature passed acts granting the city a charter, giving it a temporary government under the direct control of the governor of Virginia, and appropriating money for its expenses. Thus the sanitary conditions came under the supervision of the new government and a survey by the service was requested.

Mr. Frank found that the present conditions of Hopewell were beyond any doubt such that immediate action, almost military in nature, was imperative. The worst features of these conditions were the lack of proper privy control, the utter impassibility of many of the roads and streets, and the lack of adequate milk and food control. Mr. Frank recommended as satisfactory, if rigorously enforced, the adoption of a plan submitted by the State board of health on request of the local government. This plan was adopted, subject to the approval of the governor of Virginia, on April 1, 1916.

SANITARY SURVEY OF LEXINGTON, KY.

In connection with studies of the pollution of the Ohio River watershed, a sanitary survey of Lexington, Ky., was made by Passed Asst. Surg. L. R. Thompson and Sanitary Engineer R. E. Tarbett. The survey dealt primarily with water supply, sewage disposal, and sanitary administration. A report covering these points was submitted to the local authorities.

In this report it was recommended that a chemical and bacteriological laboratory be established at the water plant; that daily analyses of the raw and treated water be made at the plant, in addition to daily analyses of the tap water actually supplied the city at the city laboratory. In regard to sewage disposal, it was recommended that the city undertake a campaign having for its object the connection of all premises in the city to the public sewerage system. A detailed report on a sewage-disposal project was made later as a result of a further survey. (See p. 82.) Pending the carrying out of the sewerage campaign, it was recommended that all privies should be made rigidly fly proof and that regular and systematic cleaning should be insisted on.

In regard to sanitary administration it was stated that the complete reporting of all contagious and communicable diseases should be insisted upon and that all such reports should be filed and studied systematically; that all records of sanitary, milk and food, and other inspections should be filed in such a manner as to be readily accessible; that the reports of all cooperating agencies should also be filed and utilized as fully as possible; that the office of registrar of vital statistics under the State board of health might well be consolidated with that of clerk to the city board of health; and that reports of the board of health published in the city magazine should be made as popular and readable as possible.

PUBLICATIONS.

Of the publications of the service during the past fiscal year, the following relate to public health organization and administration:

REPRINTS FROM PUBLIC HEALTH REPORTS.

300. **Public Health Administration in Chicago, Ill.** A study of the organization and administration of the city health department. By J. C. Perry. August 20–September 24, 1915.
315. **Public Health Administration in North Dakota.** By Carroll Fox. December 17, 1915.
317. **Public Health Administration in Nevada.** By Carroll Fox. December 31, 1915.
340. **Public Health Administration in Florida.** By Carroll Fox. June 2, 1916.

SUPPLEMENT TO PUBLIC HEALTH REPORTS.

26. **Public Health Administration in Richmond, Ind.** A report of a survey to determine the incidence of tuberculosis. By J. C. Perry. October 8, 1915.

COOPERATION WITH FEDERAL AND STATE GOVERNMENT AGENCIES.

Throughout the section of this report dealing with the division of scientific research, mention is made of cases of cooperation with State and local health authorities. Nearly all of the field work is conducted in this way. Certain instances of cooperation with Federal and State governmental agencies should be mentioned more at length.

The facilities of the Hygienic Laboratory have been extended to a few State and local officials for purposes of instruction. The laboratory, as mentioned on p. 85, was used also as a means of instructing the officers of the service.

The practice was followed of cooperating with a number of other governmental departments and bureaus in the conduct of investigations. Among these are the Indian Service, the Bureau of Mines, and the office of Public Roads. Cooperation of a similar nature was also extended to the Hawaiian and Porto Rican health authorities and to the authorities of certain States.

COOPERATION WITH INDIAN SERVICE.

Since late in 1914 the servce has extended to the physicians of the Indian Service the facilities of its laboratories by making examinations of such specimens as might be submitted from time to time to aid in the diagnosis of communicable diseases. Diagnoses have been made at the following laboratories: Hygienic Laboratory, Washington, D. C.; Seattle, Wash.; San Francisco, Cal.; Fort Stanton, N. Mex.; St. Louis, Mo.; New Orleans, La.; Chicago, Ill. The work includes ordinary examinations and tests of a bacteriological or clinical nature.

Antityphoid vaccine is furnished through the Hygienic Laboratory to the Office of Indian Affairs on request.

Correspondence was had with the Department of the Interior and service officers in regard to conducting an investigation of mottled enamel and brown stain among Indians and others in the Southwest. Although not detrimental to health, as the brown stain does not destroy the integrity of the enamel of teeth, this condition is very disfiguring and is quite prevalent among Indians. In view of the fact that an investigation of this condition is being made by the Colorado State Dental Association, it was deemed wise to postpone any investigation by the service until the results of this work are known.

COOPERATION WITH HAWAIIAN AUTHORITIES.

As mentioned in the section of the report dealing with the leprosy investigation station, the service has cooperated with the Territorial board of health of Hawaii in the medical care of patients in isolation at Kalihi. In further cooperation, 77 lepers have been officially examined by medical boards convened by the Territorial government, and in nearly every instance at least one of the officers of the Public Health Service has not only served on the boards but has in each case performed the bacteriological examinations for the boards at the latter's request. In addition to this, at the request of the Territorial board of health, the medical officers of the leprosy investigation station have made 135 unofficial examinations of leper suspects; of these suspects 92 of the cases coming up for examination have been found not to be lepers, while the remainder have been recommended for official examination by a formal board according to law.

On request of the Territorial health authorities, also, specimens have been examined in the laboratory and other assistance has been rendered. One of the officers of the station has served as sanitary advisor to the governor of the Territory and is a member of a sanitary code commission created by the last Territorial legislature.

COOPERATION WITH PORTO RICAN AUTHORITIES.

At the request of the Governor of Porto Rico, Surg. W. W. King was detailed on September 20, 1913, for duty with the Institute of

Tropical Medicine and Hygiene of Porto Rico. This detail was in addition to his duty as chief quarantine officer for Porto Rico.

The institute is an organization of the government of Porto Rico for the study of diseases of that country and climate, and is composed of physicians with special experience in such lines.

Skin diseases.—Dr. King has paid special attention to skin diseases, such as skin ulcers, blastomycosis, ringworm, and other parasitic affections. One case of tinea nigra, a black ringworm, has been encountered, a form heretofore not reported except from the Orient and East Indies. A fungus has been identified as the cause of a frequent and troublesome inflammation of the skin of the feet.

A study of numerous skin ulcers has shown that those commonly encountered in Porto Rico are due to ordinary organisms causing ulceration and suppuration. However, there is reason to believe that a certain proportion of them are due to infection by fungi or other organisms peculiar to the Tropics.

Some results of the work on skin diseases are now being prepared for publication in appropriate scientific periodicals.

Dengue.—The occurrence in San Juan of an epidemic of dengue during the fiscal year afforded Dr. King an opportunity to make some observations upon that important tropical disease.

The subject was treated in three phases. First, an account of the disease in its epidemic course and factors influencing it; second, its clinical manifestations; and, third, a detailed study of certain important blood changes which occur in the course of the disease. Two articles embodying observations under the first two of these phases have been prepared and read at scientific meetings, but the examination of blood specimens for the third subject has not been completed.

DETAIL TO NEVADA STATE LABORATORY.

Upon request of the president of the State board of health of Nevada, Asst. Surg. N. E. Wayson was detailed to take temporary charge of the State Hygienic Laboratory of Nevada, serving in that capacity from August 30 to September 23, 1915.

The emergency upon which the request was made arose through the resignation of the former physician in charge and the necessity for continuation of the Pasteur antirabic treatment of four patients, together with the probability of having to immunize further human victims of the epizootic of rabies present in coyotes and dogs in the northern and eastern parts of the State. The duties of the laboratory were those of the antirabic immunization, diagnostic aids toward the prevention of the spread of infectious disease through the State, urinalysis, the examinations of water for bacteriological content, and educational efforts directed toward the prevention of the spread of the epizootic of rabies.

Eighteen people were given the Pasteur treatment from April, 1915, to September 23, 1915, in the laboratory, 9 of these in whole or in part during the detail of Dr. Wayson. During this time no fatalities from the disease untreated, nor fatalities from complications among those treated, have been reported.

Examinations for the presence of rabies in the heads of coyotes and dogs were made in collaboration with the veterinary department. Of 15 heads examined within the period mentioned all but 3 were positive and 2 of the latter were rejected because of decomposition. Seven of these were examined by Dr. Wayson.

A sanitary examination of the water supply of the University of Nevada was made and it was found that the supply controlled by the university conformed to the standards adopted by the service for drinking water carried by interstate carriers. This supply is obtained from a driven well on the campus; the city supply, which is also made use of, was found to be unsafe. Other water analyses were made of private supplies.

DETAIL TO ALABAMA STATE LABORATORY.

Upon request of the Alabama State Board of Health Passed Asst. Surg. J. R. Ridlon was detailed temporarily to fill a vacancy as State bacteriologist and pathologist and director of the Pasteur Institute at Montgomery, Ala. He was engaged in this work from May 1, 1916, to June 8, 1916.

The free examinations performed at this laboratory include those of a public-health nature, such as examinations of sputum, feces, spinal fluid, public water and milk supplies, blood for typhoid, malaria, etc., cultures for diphtheria, and brains of animals for rabies.

Fees are collected in all but indigent cases for the following examinations of more private nature: Wassermann tests, analyses of test meals, examinations of urine, examinations of pus smears for gonococci, preparation of autogenous vaccines, etc.

During the time specified there were received for examination 758 specimens of a general character and 69 heads of animals for the diagnosis of rabies and 53 new patients began the Pasteur treatment.

School Hygiene.

During the fiscal year the service was requested by a larger number of health and educational authorities than ever before to undertake investigations of problems of school hygiene in their respective jurisdictions. As many of these requests have been complied with as the exigencies of the service have permitted.

The scope of the investigations, which have been under the direction of Surg. Taliaferro Clark, has been broadened to include not only inquiry into the construction and sanitation of school buildings and the determination of the physical and mental status of school children, but researches in mental hygiene.

These investigations have been confined largely to rural districts. This is due to the urgent need of applying the principles of hygiene in concrete form to communities in which reside the larger part of the total school enrollment of the country, and in which regulations governing health and sanitation can not be applied to the people as a whole so effectively as in cities.

SURVEY OF THE SCHOOLS OF FREDERICK COUNTY, MD.

On the request of the State department of health and the country school authorities a complete survey of school sanitation, including a study of physical and mental conditions of the school children of

Frederick County, Md., was undertaken by the service under the direction of Surg. Taliaferro Clark. The survey lasted from November 29, 1915, to May 31, 1916. Active cooperation was given by the State department of health in these investigations, and two or more deputy commissioners of health were assigned for a period of one month each for this purpose during the whole course of the survey. The following service officers were also detailed from time to time to assist in these studies: Surg. G. L. Collins, Passed Asst. Surg. E. H. Mullan, and Asst. Surgs. G. A. Kempf, Francis A. Carmelia, and Walter L. Treadway.

A sanitary survey was made of 91 schools in the course of these investigations, 79 for white and 12 for negro children. Five of these schools were located in the city of Frederick, 4 in Brunswick, and the remainder were strictly rural schools or schools in towns of less than 2,500 inhabitants.

Physical status.—The physical status was determined in the case of 5,130 children, 2,673 boys and 2,457 girls. Of these, 3,257 white children (1,641 boys and 1,616 girls) resided in rural districts and villages with a population of less than 2,500. The number of white children examined in the cities of Frederick and Brunswick was 1,482, 846 boys and 636 girls. In addition, 391 negro school children (186 boys and 205 girls), were examined. The data collected during these investigations have not yet been completely compiled. Sufficient evidence has been adduced, however, to show that a number of these children are in need of refraction for glasses, and that a large proportion of those who have hypertrophic tonsils and adenoids have not received the needed surgical attention. The parents of children having physical defects in need of attention were notified by the school authorities in writing as soon as this information became available. The response to these notices, in the main, was immediate.

Mental status.—In addition to the physical studies the mental status was determined in the case of 4,429 white school children (2,358 boys and 2,071 girls), of whom 52 children, or 1.17 per cent of those examined, were exceptionally retarded (feeble-minded), and whose mental status will never develop above that of a child. Of the boys examined 1.61 per cent were exceptionally retarded, and of the girls 0.67 per cent.

A difference was observed in the mental status of rural and urban school children. Of the 3,020 white rural school children (1,518 boys and 1,502 girls), 38, or 1.25 per cent, were exceptionally retarded (boys 1.31 per cent and girls 1.13 per cent).

Of the 1,409 urban school children (840 boys and 569 girls), 0.99 per cent were exceptionally retarded (boys 0.95 per cent and girls 1.05 per cent).

Of the 362 colored children examined (177 girls and 185 boys), 4.1 per cent were exceptionally retarded (girls 2.1 per cent and boys 6.2 per cent).

The application of the Binet-Simon tests to each of the above-mentioned classes gave the following percentages of exceptional retardation: Of the total white school children, 1.08 per cent; of the rural white school children, 1.22 per cent; of the city white school children, 0.73 per cent; of the negro school children, 6.6 per cent.

The number of retarded white school children in the county, including 52 defectives, who were in need of special or individualized training, was 434, or 9.1 per cent of the total examined. Among the rural school children the number was 313, or 10.36 per cent of those examined, and in the city schools, 121, or 8.58 per cent. The number of retarded negro children in need of special training, including 15 defectives, was 123, or 33.9 per cent of those examined.

The average retardation of white rural school children in school years as recorded by teachers was for retarded boys 2 school years and for defective boys 3.2 school years, while that for retarded girls was 2.4 school years and for defective girls 2.8 school years. In the city schools the retarded boys were 2.2 school years and the defective boys 2.6 school years behind grade, while the retarded girls were 2.02 school years and the defective girls 2.67 school years behind in school work.

Among the negro school children the retarded boys were 2.72 school years and the defective boys 4.1 school years, and the retarded girls 2.2 school years and the defective girls 3 school years behind grade.

MENTAL STATUS OF SCHOOL CHILDREN OF ARKANSAS.

On request of the governor, the Arkansas Commission for the Feeble-minded, and the State board of health, Asst. Surg. Walter L. Treadway was detailed to make an investigation of the prevalence of mental deficiency among the school children of Arkansas. The purpose of this investigation, which began in January, 1916, and will be completed about October 1, is to collect certain data for the Arkansas Commission for the Feeble-minded, to show the extent of feeble-mindedness, and the need of the hygienic care and special training of feeble-minded persons within the State. For this purpose it was decided to examine all the school children and as many other persons as possible in a number of representative counties located throughout the State. In order that the information obtained might be utilized as soon as possible by other agencies cooperating with them, it was reported upon from week to week.

At the close of the winter school term, June 1, 1916, the mental status had been determined in the case of 13,822 school children (6,850 boys and 6,972 girls). The number of schools visited for this purpose was 71 (53 rural and 18 urban), in 13 counties. The number of feeble-minded children encountered was 87 (48 boys and 39 girls), or 0.63 per cent of those examined (boys 0.7 per cent and girls 0.55 per cent).

The percentage of feeble-minded children varied in different parts of the State, and was higher in rural districts than in urban. The number of children examined in the 53 rural schools was 6,175 (2,938 boys and 3.237 girls), of which number 0.64 per cent were feeble-minded (0.7 per cent of the boys and 0.58 per cent of the girls). In addition to these, 0.6 per cent of the boys and 0.3 per cent of the girls were border-line cases, whose mental status is problematical.

The number of children examined in the 18 city schools was 7,647 (3,912 boys and 3,735 girls), of which number 0.6 per cent were feeble-minded (0.68 per cent of the boys and 0.53 per cent of the girls). In addition to these, 0.56 per cent of the boys and 0.42 per cent of the girls were border-line cases.

Simple retardation was observed in 1.4 per cent of the boys and 1.2 per cent of the girls in rural schools, and in 1.3 per cent of the boys and 0.96 per cent of the girls in the city schools.

On the basis of the population as given in the 1910 census report Dr. Treadway estimates that there are 2,790 white children between the ages of 1 and 14 years in the State of Arkansas who are feeble-minded, and that there are at least 2,310 adult feeble-minded white persons in the State. In other words, there are not less than 5,000 persons in the State of Arkansas who are suffering from mental defect and in need of protection and supervision in the interest of health and race development.

In the course of this survey by Dr. Treadway, the sanitary conditions of all the schools visited by him were noted and inquiries made into the prevalence of endemic diseases in the communities represented, notably trachoma. (See p. 38.)

MENTAL STATUS OF RURAL SCHOOL CHILDREN IN NEW CASTLE COUNTY, DEL.

On request of the Delaware State Board of Health and the State commissioner of education studies of the physical and mental status of the school children of New Castle County, exclusive of the city of Wilmington, were started January 3, 1916. Owing to exigencies these studies were confined to a determination of the mental status by Passed Asst. Surg. E. H. Mullan. In the course of his investigation Dr. Mullan visited 108 schools, 84 for white children and 24 for negroes, and examined 3,793 school children, of which number 19, or 0.5 per cent, were distinctly feeble-minded and in need of institutional treatment. In addition to these 50 other children were observed who could not be diagnosed positively as being feeble-minded within the limits of one examination. Furthermore, 9 other children were noted who were suspected of epilepsy and 8 were epileptic.

In addition to these studies Dr. Mullan visited 30 schools in the city of Wilmington to determine the mental status of 112 children specially selected by the educational authorities for this purpose. Of these 20, or 17.85 per cent, were feeble-minded; 22, or 19.64 per cent, probably feeble-minded; 9, or 8.3 per cent, border-line cases; and 3, or 2.67 per cent, epileptics.

The complete report of Dr. Mullan will appear in published form in the near future. In it is given an analysis of the results of his examinations, a description of the methods employed for the determination of the mental status, and recommendations for State provision for care of the feeble-minded.

These studies of Dr. Mullan are to be supplemented, with the opening of schools for the fall term, by a sanitary survey of the schools visited by him and a study of the physical condition of the school children.

STUDIES ON SOUTHERN SCHOOL CHILDREN.

One of the difficulties that has faced investigators of conditions among southern children has been the lack of satisfactory average standards that could be used as bases of comparison for children in this part of the country. To lessen this difficulty, Prof. C. W. Stiles, of the Hygienic Laboratory, studied over 2,000 school children in one city. Some of the results were summarized in the annual report for 1915 (p. 71). Further data collected during this investigation have been tabulated and studied this past fiscal year and various manuscripts have been published. (Reprints Nos. 286, 288, 301, 303, and 306 from the Public Health Reports.)

Popular ignorance regarding age.—One of the points brought out has been a greater lack of knowledge by school children in regard to their age than had been assumed. Children were found even in high-school classes who did not know either their age or their birthday, and in many cases the exact data could not be obtained even from their parents. This lack of knowledge is more common in rural than in urban districts and among negroes than among whites. As the registration of births becomes more complete this primitive condition will disappear.

Unconscious coprophagia.—Of 776 white school children (446 boys, 330 girls) and 511 negro pupils (226 boys, 285 girls) 28 per cent of the whites (34.30 per cent of the boys, 19.70 per cent of the girls) and 48.12 per cent of the negroes (boys 47.34 per cent, girls 48.77 per cent), according to Prof. Stiles, gave positive proof of unconscious coprophagia. The percentages among children living under privy sanitation were greater than among pupils living under sewer sanitation. The bearing of these statistics upon the question of infection with typhoid, dysentery, and certain parasitic diseases is self-evident.

Heights and weights.—In a study of 1,652 white children (771 boys, 881 girls) it was found that in general the sitting height is a little more than one-half of the standing height, but in girls from 13 to 17 years, inclusive, it is considerably more than one-half of the standing height.

The children show two rather remarkable interruptions in growth. At 11 there is a rather striking decrease of the increase in the standing height, sitting height, and weight of boys, and a less marked decrease of the increase in the sitting height of the girls.

At 14 there is a sudden and very pronounced retardation of the increase in the standing height, sitting height, and weight of girls, who (it is rather suggestive to note) averaged their first menstruation at 13.2 years of age. The change in growth of boys at this age is less marked, but at 16 there is a marked interruption in the increase of their weight.

From 6 to 13 years there is no constant and uniform difference in growth between the boys and the girls, but from 13 to 17 years the growth of the boys is in general far in excess of that of the girls, and this difference is especially marked at 17.

In general, children showing hookworm infection (mostly light cases) show an average growth appreciably below that of the average child.

Spirometer tests for lung capacity.—Data are available for 1,618 white pupils (751 boys, 867 girls). From 6 to 13 years of age, the boys showed an average from 100 to 200 cubic centimeters greater lung capacity than the girls. From 14 to 17 years the boys have progressively from about 300 to about 1,100 cubic centimeters greater lung capacity than the girls. From 6 to 13 years, the yearly increase in lung capacity among the girls is very similar to that of the boys, but from 14 years on there is a distinct decrease of the increase among the girls, as compared with the boys.

Additional studies are being made of the data collected and will be summarized in a subsequent publication.

EXAMINATION OF BOYS IN NATIONAL TRAINING SCHOOL.

The service has undertaken to make, at the Hygienic Laboratory, routine blood tests, including Wassermann reactions, of the inmates of the National Training School for Boys, the material obtained to be used in connection with other scientific data collected by the service. Nine hundred and seventy-seven tests were made by the end of the fiscal year, 539 of these being for diphtheria.

DATA FOR CERTAIN SCHOOLS IN KENTUCKY AND VIRGINIA.

Of 117 schools visited during the year by personnel of the service in connection with the trachoma prevention work, only 17 had closets that could be classed as sanitary, 38 had surface closets, while the remaining 62, or 53 per cent, had no accommodations whatever. These schools were located in the vicinity of the service trachoma hospitals at London, Ky., and Coeburn, Va. (See p. 33.)

PUBLICATIONS.

Of the publications of the service during the fiscal year the following related to school hygiene:

PUBLIC HEALTH BULLETIN.

77. **Rural School Sanitation,** including the physical and mental status of school children of Porter County, Ind. By Taliaferro Clark, G. L. Collins, and W. L. Treadway.

REPRINTS FROM THE PUBLIC HEALTH REPORTS.

286. **Zooparasitic Intestinal Infections.** An analysis of infections found among 1,287 school children (776 white, 511 negro) of the city of X. By C. W. Stiles. July 2, 1915.
288. **Intestinal Infections.** The school grades attained by 2,166 white school children (1,062 boys, 1,104 girls) in the city of X, classified by age, sanitation, and intestinal parasites. By C. W. Stiles. July 2, 1915.
301. **Tobacco and Snuff:** Their use by white school children in the city of X. By C. W. Stiles and D. N. Richards. October 1, 1915.
303. **Heights and Weights of Children.** Classification, by age and by sanitation, of 1,652 white school children (771 boys, 881 girls) in the city of X. By C. W. Stiles and George A. Wheeler. October 8, 1915.
306. **Lung Capacity of Children.** Spirometer tests of 1,618 white school children (751 boys, 867 girls) in the city of X. By C. W. Stiles and Floyd Graves. October 15, 1915.
316. **Memory Tests of School Children.** Memory span of 1,585 white school children (751 boys, 834 girls) in the city of X. By C. W. Stiles. December 24, 1915.

SUPPLEMENT TO THE PUBLIC HEALTH REPORTS.

25. **School Hygiene.** Survey of schools in Manatee County, Fla. By J. A. Nydegger. July 30, 1915.

Rural Sanitation.

An important line of work undertaken by the service in recent years has been the studies of and demonstrations in rural sanitation. Briefly expressed, the objects of this work may be said to be: (1) A determination of the causes responsible for insanitary conditions in rural communities and their effect upon the health of the population; (2) a demonstration to rural residents of how the most prevalent diseases are brought about and of how they can be prevented most effectively and economically. The ultimate purpose is to awaken in rural communities an individual and communal interest in public-health questions which will in turn lead to an improvement in sanitary conditions and the maintenance of an efficient local health agency.

The general interest shown in this work has been evidenced in the requests for sanitary surveys which have been received from practically all sections of the country, not only from State and local health authorities, but from civic associations and public-spirited citizens eager to secure for their localities the benefits of the work. As a general rule, the limited funds available have made it impracticable to comply with these requests. It is gratifying to state that during the year a special appropriation of $25,000 was made by Congress for the specific purpose of continuing these studies. While this comparatively small sum did not permit the further expansion of the work, it made possible the completion of the studies previously inaugurated and the beginning of similar activities in four more counties.

The plans for these surveys have been generally the same as in previous years, namely, visits to as many individual homes as possible; reinspections of a certain number of homes in different neighborhoods to find out the sanitary improvements carried out; delivery of lectures on sanitation; inspections of public buildings; securing the cooperation of civic organizations and prominent citizens; and, finally, surveys of the incorporated towns in the county and making specific recommendations to the authorities which will bring about sanitary disposal of excreta, prevention of fly breeding, and protection of food and water supplies.

WORK COMPLETED DURING YEAR.

During the year the field work was continued under the direction of Surg. L. L. Lumsden. The sanitary surveys of Walker County, Ala.; Dallas County, Iowa; Wilson County, Kans.; Anne Arundel County, Md.; and Orange County, N. C., referred to in the last annual report (see pp. 73–75) were completed during the year. In these five counties during the fiscal year 18,805 homes were canvassed and surveyed, 5,000 of which were revisited to determine the improvements which were carried out. The work began and terminated in these various counties as follows:

Walker County, Ala., May 24–October 25, 1915; Dallas County, Iowa, June 15–October 26, 1915; Wilson County, Kans., May 1–October 23, 1915; Anne Arundel County, Md., April 21–September 30, 1915; Orange County, N. C., May 4–November 6, 1915.

Results.—The immediate results of the studies in these five counties during the entire survey show the following data:

	Homes inspected.	Homes revisited.	Churches.	Railroad stations.	Post offices.	School-houses.	Lectures delivered.
Walker County, Ala	7,130	1,004	40	9	12	....	71
Dallas County, Iowa	6,037	501	60	20	11	146	26
Wilson County, Kans	4,390	200	35	11	1	96	25
Anne Arundel County, Md	7,543	1,844	18	2	7	59	42
Orange County, N. C	3,253	2,317	....	....	....	....	84
Total	28,353	5,866	153	42	31	301	248

The officers in immediate charge of the surveys of these counties were Asst. Surgs. R. E. Wynne, K. E. Miller, H. C. Yarbrough, J. B. Laughlin, and Asst. Epidemiologist F. E. Harrington, respectively.

WORK NOW IN PROGRESS.

During the present fiscal year, similar studies were begun in Tuscaloosa County, Ala., on March 10, 1916; Floyd County, Ga., on March 8, 1916; Greenville County, S. C., on March 9, 1916; and Obion County, Tenn., on April 13, 1916. The officers in immediate charge of the work in these counties were Asst. Epidemiologist F. E. Harrington and Asst. Surgs. W. H. Slaughter, R. E. Wynne, and K. E. Miller, respectively.

Results.—The results of the work at the end of the fiscal year showed the following:

	Homes inspected.	Churches.	Railroad stations.	Post offices.	School-houses.	Rural stores.	Lectures delivered.
Floyd County, Ga	6,453	42	10	....	38	60	97
Greenville County, S. C	10,502	91	7	4	86	149	100
Obion County, Tenn	4,241	72	7	3	56	....	60
Total	21,196	205	24	7	180	209	257

On account of the fact that only one officer was available, the studies at Tuscaloosa County have been limited to assisting the county health officer in sanitary inspections, installation of sanitary privies, and educational work in various parts of the county.

GENERAL RESULTS OF RURAL SANITATION WORK.

Since the beginning of this work in the spring of 1914, improved methods of sanitation have been determined from the wide-ranging studies. As the value of sanitary improvements in disease prevention becomes more recognized in rural communities, the willingness of the citizens to bear the cost of such improvements becomes likewise more marked. As a result of the investigations made it has been found that the average rural citizen is not only willing but eager to do all in his power to improve conditions. Some member of the family usually accompanies the investigator in making the surveys and observes with him the sanitary status of the premises.

From the interest displayed and the eagerness with which the suggestions of the investigators are carried out it is safe to assume that when the results of better sanitation are seen in improved economic and health conditions which inevitably follow, the work will increasingly progress, and each county in which an investigation has been conducted will become a potent educational factor of the community and the State in which it is located.

Speaking from an investigative viewpoint, the data obtained in regard to sanitary conditions in rural sections have justified in themselves the amount of money spent in the sanitary surveys. Turning to the immediate practical results, the improved sanitary conditions in the counties surveyed furnish proof that the cost of the work is many times less than the savings in disease and human lives accomplished. In addition, every one of these counties provides an object lesson to other counties of the feasibility of rural sanitation, a desideratum of so much importance to the country as a whole.

In view of the fact that under existing conditions there will be in the rural districts thousands of deaths and hundreds of thousands of cases of illness which are entirely preventable, it would seem that an enlargement of the work on rural sanitation as conducted by the service in cooperation with State and local authorities should receive favorable consideration, the vastness of the problem and its nationwide extent making it one of especial concern to the Federal Government.

Investigation of Pollution of Streams.

Investigations of the pollution of streams are conducted by the service for the purposes of gaining accurate knowledge in regard to existing conditions and the influence of these conditions on disease prevalence and of devising remedial measures which may become subjects of legislation. During the past fiscal year such studies comprised the following:

I. A continuation of studies of pollution of the Ohio River, begun in 1913, namely:

1. Further laboratory studies of the pollution and self-purification of the Ohio River, confined, as during the year 1915, to a stretch of the river from a point immediately above Cincinnati to Louisville, Ky.

2. A critical study of the municipal filtration plants of Cincinnati and Louisville, with reference to their efficiency in relation to degrees of river pollution.

3. Completion of a general survey of the conditions and public-health effects of stream pollution on the Ohio River watershed as a whole, this survey having been begun in the latter part of the previous fiscal year.

II. An extension of the investigations to include a survey of the status and public health consequences of stream pollution in a broader area of the United States. This survey, begun in the State of New Jersey in the summer of 1915, has been extended during the summer of 1916 to cover all Atlantic coast watersheds north of the Potomac and east of the Ohio River, excepting, for the present, watersheds in the State of Pennsylvania.

Organization.—At the beginning of the fiscal year 1916 the working organization comprised the administrative headquarters and main laboratory at Cincinnati, Ohio; branch laboratories at the Cincinnati and the Louisville filtration plants; two field parties engaged upon sanitary surveys of the cities and villages situated on the Ohio River watershed and its tributaries, and one field party engaged upon similar surveys in the State of New Jersey.

The personnel consisted of 5 medical officers, 1 pharmacist, 4 sanitary engineers, 1 special expert (biologist), 2 sanitary chemists, 6 sanitary bacteriologists, and 14 attendants. Upon completion of the sanitary surveys, the personnel was reduced by the transfer of 1 medical officer, and the resignation of 1 sanitary chemist and 1 sanitary bacteriologist. During the year the personnel was increased temporarily by 1 epidemiologist, 2 sanitary engineers, 1 sanitary bacteriologist, and 8 attendants. The entire personnel was engaged during the winter in carrying on laboratory work at Cincinnati and Louisville and in the compilation of data already collected. At the close of the fiscal year the bulk of the data had been compiled and analyzed and was ready to be edited.

OHIO RIVER.

Laboratory work.—The laboratory studies, as organized at the beginning of the fiscal year, were carried out at the main laboratory in Cincinnati and the branch laboratories at the Cincinnati and Louisville filtration plants.

The same fixed sampling points, established for study during previous years and chosen with great care above and below the points of most definite and important pollution and near the mouths of the most important tributaries, were still used. Samples were collected daily by motor launch and boat during the entire year from these sampling stations on the Ohio River and such of its tributaries as were accessible.

The schedule from July 1, 1915, to March 1, 1916, included sample collections daily, and from March 1, 1916, to July 1, 1916, on alternate days from four carefully selected sampling stations on the Ohio River below Cincinnati. Samples were collected from the Ohio River opposite the Cincinnati filtration plant and from the Ohio River at Louisville daily for the entire year. Collections were made daily up to March 1 and on alternate days after that period from sampling points near the mouths of the following tributaries: Little Miami, Licking, Mill Creek, and Great Miami. Collections were made twice weekly from the Kentucky River at its mouth and from a sampling station on the Ohio River just above the mouth of the Kentucky.

The municipal water supplies of Cincinnati, Newport, Covington, and Louisville were examined daily for the entire year.

Beginning November 9, 1915, samples were collected weekly from one of the fixed sampling points on the Ohio River, from Mill Creek and from one of the sewers of Cincinnati for special study.

Bacteriological studies.—All samples collected from the river stations and from municipal supplies have been examined bacteriologically, the routine examinations, including total bacterial counts on gelatine at 20° C., for 48 hours and agar at 37° C., for 24 hours, with quantitative and qualitative tests for bacteria in the *Coli* group.

These examinations have been made in each instance at the laboratory within a few hours after collection.

In addition to the routine examinations above mentioned, additional bacteriological work has been done both at Cincinnati and at Louisville in a study of multiplication of bacteria in river water and sewage in samples stored at 10°–20° and at 37° C., respectively, for various periods of time with a view to explaining certain phenomena observed in the examination of river samples. These studies are still being pursued.

Bacteriological studies of industrial wastes were taken up in May, 1915, in connection with the chemical studies of the same wastes.

The chemical studies of the Ohio River and its tributaries carried on during the year have been extended in part for sampling stations extending from above Cincinnati to the intake of the Louisville water works. These studies have included turbidity readings on practically all samples, alkalinity determinations on samples from all tributaries, and from three or four sampling stations on the Ohio River and extended sanitary and mineral analyses on samples collected from critical stations. Oxygen demand studies of the water of Mill Creek, Cincinnati, have been made regularly. Dissolved oxygen determinations on river samples while carried on extensively in 1915 were discontinued during this year as sufficient data had already been collected.

The compilation and analysis of all of the chemical and physical data have been completed. An important part of this work has been the formulation of a complete theory of the oxygen self-purification of streams, and the derivation of fundamental constants defining the rates of reaeration of the Ohio River under various channel and flow conditions.

A study of the coefficient of fineness of suspended matter in the Ohio River was taken up in February, 1916.

Plankton studies.—Weekly samples for plankton study were collected until December, 1915, in the Cincinnati-Louisville stretch of river. Study of these has been practically completed. Resulting data, together with data from samples collected during 1914, are being embodied in a report to be issued in the near future.

Samples of bottom sediments were collected twice a month in this same stretch of river. These have been studied with a view to determining the sanitary significance (1) of certain physical characteristics of color, odor, and consistency, and (2) the presence of worms, insect larvæ, and other organisms.

An effort is being made to correlate the results of these mud examinations with the results of plankton examinations of that water which overlies the mud and thus to establish to some degree the sanitary significance of the bottom sediments.

Laboratory examinations.—The following is a summary of the laboratory examinations made during the course of the year, exclusive of the special studies at the branch laboratories:

Bacteriological examinations:	
Routine river and tap samples	7,259
Stored water samples[1]	268
Industrial waste samples[2]	109

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[1] Each stored water sample was examined 10 times.
[2] Each industrial waste sample was examined 5 or 6 times.

Chemical determinations:	
Turbidity determinations	6,842
Alkalinity determinations	2,210
Oxygen demand determinations	212
Sanitary analyses	399
Mineral analyses	84
Biological (microscopic) examinations:	
Of water samples [1]	470
Of mud samples [1]	122
Of miscellaneous samples [1]	15

Hydrometric survey.—The compilations of discharge and velocity of flow, previously completed up to October 15, 1914, have been extended in part up to December 31, 1915. Compilations thus extended embrace the discharge of the Ohio River at all sampling stations from above the Little Miami River to below Louisville, Ky., and of the following tributaries at their mouths: Little Miami, Licking, Great Miami, and Kentucky rivers. Compilations of velocity embrace adjoining main stretches of the Ohio River from Pittsburgh to above the Little Miami River, and stretches between all of the regular sampling stations from above the Little Miami River to below Louisville. Additional flow gagings have been made of the Little Miami River and of Mill Creek at Cincinnati. A detailed study of the run-off of the Mill Creek drainage area has also been made.

WATERSHEDS TRIBUTARY TO THE OHIO.

A survey of the status of stream pollution on watersheds tributary to the Ohio River, begun in May, 1915, was completed in November, 1915. Although the work of the field parties in the previous year was supplemented by bacteriological examinations of municipal supplies of cities on the Ohio River, no such arrangement was made for the examination of water supplies during the fiscal year 1916.

Two field parties were assigned to this work, namely: Passed Asst. Surg. L. R. Thompson, with Sanitary Engineer R. E. Tarbett and Asst. Surg. H. F. Smith, with Sanitary Chemist Jay A. Craven. The former party covered all the territory in the southern half of the watershed and the latter party, assisted in October by the first field party, completed a survey of the upper half of the watershed. Though covering separate territories the two parties were in close coordination.

In making these surveys each community has been carefully studied from two main standpoints, namely, the amount and character of the polluting wastes discharged into each stream in relation to the size and character of the stream, and the effect of existing stream pollution conditions upon the health of the community population.

A careful study of the pollution of the river has been made, by estimating the amount of domestic sewage and the amount and character of industrial wastes discharged into the Ohio River and its tributaries by each community, based on data collected in each community from all available sources. In making a survey of industrial wastes, a visit to practically every important waste-producing plant on the watershed was necessary.

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[1] Each sample was examined a number of times.

From the standpoint of the effect of pollution of streams on the public health a careful study has been made in each community of sanitary conditions, the first step in each survey being the assembling of such data as are available from State boards of health and other State offices. These are supplemented by visits to the more important centers of population on each watershed, including all cities of 10,000 population or more. Data are obtained on the character and amount of wastes discharged, together with a study of the prevalence of typhoid fever and of the factors contributing to its causation.

ATLANTIC COAST WATERSHEDS.

The survey of the Atlantic coast watersheds in the State of New Jersey, begun in May, 1915, was completed in October, 1915. The field party consisted of Passed Asst. Surg. Paul Preble and Sanitary Engineer J. K. Hoskins. The survey was carried out along the same lines as that of the Ohio River watershed. New Jersey was chosen in order that the work could be coordinated with investigations of the pollution of coastal waters carried on along the New Jersey coast at the same time under the direction of Surg. H. S. Cumming. (See p. 75.)

During the latter part of the year preliminary plans were made for an extensive survey of the watersheds on the Atlantic coast north of the Potomac River upon approximately the same lines as the surveys covering the Ohio River watershed and the State of New Jersey.

The territory to be surveyed was selected for the reason that it is continuous with the areas already covered in the Ohio Valley and the State of New Jersey and for the additional reason that within this territory the problems of stream pollution are more acute than in other sections of the United States. The general scope of the survey has been approximately the same as that of the surveys made during the past year—that is, each watershed has been studied as a unit from the standpoints of the existing conditions of stream pollution and their effects upon the public health.

In order better to coordinate the work of the survey parties engaged, a change was made in the organization. The coordination of the epidemiologic data collected by both field parties has been under the immediate supervision of Epidemiologist A. W. Freeman.

Another change made was to assign two engineers instead of one and a medical officer to each field party.

A survey of the New England watersheds with the above plans in view was begun in May, 1916. Field party No. 1, in charge of Passed Asst. Surg. Paul Preble, with Sanitary Engineers Hoskins and Crohurst, started work on the Hudson River watershed. Field party No. 2, in charge of Passed Asst. Surg. L. R. Thompson, with Sanitary Engineers Tarbett and Stromquist, began the collection of necessary data at Albany, N. Y. A few days later field party No. 2 commenced work on the survey of the Susquehanna watershed in the State of New York. Up to July 1, 1916, the following watersheds had been surveyed in their entirety, or nearly so, by both field parties:

Hudson River watershed.
Connecticut River watershed.
Susquehanna River watershed.
Merrimac River watershed.
Housatonic River watershed.

It is the intention to have the work completed during the summer in the northern part of the Atlantic coast, coordinated with investigations of the pollution of coastal waters being carried out along the coast under the supervision of Surg. H. S. Cumming.

To begin the compilation of epidemiologic data available from the records of the State boards of health, Epidemiologist A. W. Freeman left Cincinnati in June, 1916, and proceeded to Boston, Mass. After the work had been completed there, Hartford, Conn., was next visited for a like purpose. Although each party is covering separate territory, they are in close coordination with each other and with the epidemiologist.

The ultimate object of this work is to assemble for all watersheds sufficiently uniform data to enable comparison to be made of the various river systems with respect to the extent, effects, and control of their pollution. In all the States covered by this survey the State health authorities have given their hearty cooperation.

STUDY OF THE CINCINNATI AND LOUISVILLE FILTRATION PLANTS.

An intensive study of the purification of the Cincinnati and Louisville water supplies, both being derived from the Ohio River, was begun in May, 1915, and has been carried out continuously up to June 30, 1916, under the direct supervision of Sanitary Engineer H. W. Streeter. The purpose of this study has been to examine, through intimate and continuous observation over a long period, the variable burden imposed by the character of the Ohio River water upon the efficiency and economy of purification of the above-named water supplies. The Cincinnati and Louisville filtration plants may be assumed to typify, from the standpoints of design, construction and skilled operation, the highest practicable modern resources available in the purification of the Ohio River water.

Branch laboratories established at each of the above plants have furnished information concerning the daily bacteriological and chemical character of the water at each step of its purification from the river intake to the city mains.

Coordinate data with reference to the operation of each plant have been gathered and compiled, showing the physical and economic conditions surrounding the purification process. Studies of the influence of the plankton upon various phases of the operation of both plants have been carried on in conjunction with the present studies by Special Expert W. C. Purdy.

The main objective in view in the plankton study is the possible locating of that condition of suspended matter or of plankton content which results in clogging filters and in shortening the "run" at certain times of the year. Secondary objects are the effect of coagulant and microscopic organisms (plankton), the rôle of the settling basin as a breeding place for plankton organisms, and finally the efficiency of the filters in removing such organisms, many of which possess considerable power of locomotion.

Epidemiologic studies of the prevalence of typhoid fever in Cincinnati and Louisville are in progress under the direction of Epidemiologist A. W. Freeman. These will afford valuable information and will be still further enhanced by correlation with the data obtained in an intensive study of typhoid fever in Portsmouth, Ohio, during the year from October, 1913, to October, 1914.

WATER SUPPLY OF FLORENCE, ALA.

In connection with the Ohio River investigation a sanitary survey of Florence, Ala., was made by Sanitary Engineer R. E. Tarbett. This included a study of the water supply of the city, as the city commissioners desired advice in regard to possible treatment of the present supply or the advisability of abandoning it and developing a new supply. At present the waterworks are owned by a private company, but the city may at stated intervals exercise an option to purchase them.

The water supply is taken from Cypress Creek, about 3 miles northwest of the central section of the city. The creek is at times turbid and rather badly polluted. The conclusion of Mr. Tarbett was that it was not advisable to consider changing the source of supply, since the present supply is adequate and may be made safe and of good quality by the installation of the proper treatment plant at a much less first cost and lower operating cost than those of a supply from any other source contemplated. Furthermore, the water from the present source, being softer (lower in mineral constituents) is preferable for domestic uses. Mr. Tarbett recommended the installation of a mechanical system of filtration, a system especially applicable to waters of considerable turbidity or color and high bacterial content. He stated that this treatment should be followed by disinfection with calcium hypochlorite or chlorine gas. A copy of his report was submitted to the local authorities.

WATER SUPPLY OF FORT THOMAS, KY.

Advice and assistance were rendered the State Board of Health of Kentucky relative to safeguarding the water supply of Fort Thomas, a United States Army post being used as a mobilization camp for the Kentucky National Guard. In June, 1916, Sanitary Engineer H. W. Streeter was sent by Dr. Frost to advise the State authorities as to the immediate installation of a disinfecting plant, which previous surveys in connection with the Ohio River investigation had shown to be necessary. A temporary plant was installed, and the service has continued its cooperation by making occasional visits to the plant and by making daily bacteriological examinations of the treated water.

WATER SUPPLY OF MARINE CORPS RECRUITING PUBLICITY BUREAU, NEW YORK CITY.

On request of the Secretary of the Navy Department, Surg. C. H. Lavinder was directed to make an investigation of the water supply of the Marine Corps Recruiting Publicity Bureau, New York City. He found that the water supplied to the bureau was a potable water not injurious to the health of the persons employed in that office. It appeared, however, that there were some objectionable local conditions in the building, which disappeared after cleaning out the storage tank on the roof.

Pollution of Coastal Waters.

The field investigations of coastal waters, which had covered the waters of Maryland and Virginia, including Chesapeake Bay and its tributaries, were continued throughout the year and extended to the coastal waters of Delaware, New Jersey, New York, and Connecticut, including the important shellfish-bearing and bathing waters of Delaware Bay and tributaries, lower New York, Raritan, and Jamaica Bays, New Haven Harbor and vicinity, as well as a study of the Atlantic coast from the Virginia Capes to New York, and reexamination of certain areas in Chesapeake Bay and tributaries.

NEW JERSEY, NEW YORK, AND DELAWARE.

In view of the importance of studying the sanitary conditions of Raritan Bay, Shrewsbury River, and the Atlantic coast resorts during the summer season, the laboratory steamer *Bratton* was utilized by Asst. Surg. Waller, Sanitary Engineer Haskins, and Bacteriologist Stewart to study the tides and currents and to make laboratory examinations of shellfish and water in those areas until the latter part of August, when the vessel was removed to Delaware Bay. A sanitary survey of the district was made by the sanitary engineer, while a medical officer studied the incidence of typhoid fever.

Surg. Cumming, in charge of the investigations, inspected the inland waters and communities along the ocean shore from Cape May to Tuckerton, using the laboratory launch of the New Jersey State Board of Health and cooperating with its representatives. A sanitary survey was made by Mr. Haskins. On August 29, owing to the need for the State boat elsewhere, the investigation was temporarily discontinued and was completed during the winter months by Asst. Surg. Waller. Passed Asst. Surg. Draper was temporarily detailed to study the incidence of typhoid fever along the coast.

Upon arrival of the laboratory steamer in Delaware Bay an intensive study was made of the pollution and self-purification of the Delaware River and Bay and of the important oyster growing, floating, and shipping areas of Delaware Bay, Maurice and Cohansey Rivers. The study of the latter rivers included sanitary surveys by Sanitary Engineer Hoskins, float and current studies, and the examination of large numbers of samples of shellfish and water.

The laboratory steamer and personnel then returned to Raritan Bay and vicinity and continued work in that locality and Jamaica Bay until ice began to form, when work was resumed on Maurice and Cohansey Rivers.

The results of the investigation of the tidal waters of New Jersey and adjacent waters of New York and Delaware were recorded in a manuscript soon to be published. As a result of laboratory examinations and sanitary surveys it was determined that these waters, with the exception of certain small areas, were free from pollution. However, it was found that almost all of the oysters grown in these waters were removed to small creeks or rivers where the salinity of the water was less, for the purpose of "freshening" the oysters before shipment. The sanitary condition of such oysters depends upon the condition of these creeks rather than on that of the beds in which they are grown, and the waters of some of these "drinking" places have been found to be polluted or of doubtful quality. Active steps to remedy conditions and to prevent the pollution found have been taken by the New Jersey State Department of Health.

A reexamination of the area in Raritan Bay containing shellfish beds was made in cooperation with the city of New York and Bureau of Chemistry, as a result of which the oysters from this area were admitted to interstate and the municipal markets.

MARYLAND AND VIRGINIA.

A report of investigations of the pollution of the coastal waters of Maryland and Virginia, made in the fiscal year 1915, was published as Public Health Bulletin No. 74. During the past year these investigations have been continued. Following a request by the governor of Virginia, Surg. Cumming and Engineer Haskins made additional studies of certain areas in lower James River, Va., during September, 1915.

Late in December, 1915, the steamer *Bratton* was sent to Chesapeake Bay for work in cooperation with the State department of health of Maryland. The investigation during the winter included an intensive study of Annapolis and Cambridge Harbors and those portions of Chesapeake Bay adjacent thereto.

During the winter work was continued at the Hygienic Laboratory, collection of samples of oysters from Spa Creek, Annapolis, being made at regular intervals. As the result of a request of the State authorities of Virginia, an investigation of the sanitary conditions in Lynnhaven Bay was made in April by Surg. Cumming and Sanitary Engineer Harrub, definite recommendations being made to remedy certain bad conditions found near Virginia Beach.

NEW YORK, CONNECTICUT, AND RHODE ISLAND.

In April work was begun in the investigation of Long Island Sound and the waters of New York, Connecticut, and Rhode Island.

The sanitary conditions in and around New Haven are also being studied thoroughly in cooperation with the municipal and State authorities. Through the courtesy of the Yale authorities, the field party in this vicinity, which consisted of Asst. Surg. Waller, Sanitary Engineer Harrub, Bacteriologist Veldee, and attendants, used the laboratories of Yale University Medical School, and especial thanks are due Profs. Winslow and Bartlett for the offer and use of the laboratories.

For years, despite the outbreak of typhoid fever traced to oysters from Indian Creek and the creek near Innwood, both tributaries of Jamaica Bay, and the large amount of sewage discharged into the bay, a large proportion of oysters consumed in New York City have come from those waters, which are also used for bathing. While the city has admitted such oysters and the Bureau of Chemistry has permitted interstate shipments from certain parts of the bay, it has been deemed important to study the area carefully.

Assist. Surg. Carmelia with Bacteriologist Pincus have therefore been making a study of tides and currents and laboratory examinations of shellfish and water samples from the bay, in the laboratory of the Bureau of Chemistry in New York, the facilities of which were extended by Dr. Carl Alsberg, chief of that bureau.

ORIGIN OF TYPHOID FEVER IN CERTAIN STATES.

An investigation was made as to the origin of a series of outbreaks of typhoid fever in Illinois, Indiana, Pennsylvania, and New York, as a result of which serious insanitary conditions were found in various oyster-shucking houses.

FISHERMANS ISLAND LABORATORY.

The experimental work at the temporary laboratory on Fishermans Island, Va., was continued until winter, when Sanitary Chemist W. F. Wells returned to the Hygienic Laboratory for the preparation of a report. Certain phases of the investigation were continued by Asst. Surg. Lake and Bacteriologist Pincus until April, when Passed Asst. Surg. Hasseltine and Sanitary Chemist Wells again took up the work at Fishermans Island. Important problems are being studied relating to the self and artificial purification of oysters and the disappearance rate in sea water and shellfish of *B. typhosus* and *B. coli.* A report has been published in the Public Health Reports and issued as Reprint No. 351.

Industrial Waste Studies.

This branch of the investigations of the pollution of navigable waters has continued under the general direction of Prof. E. B. Phelps, chief of the division of chemistry of the Hygienic Laboratory, during the past fiscal year. The headquarters for the fieldwork have been at the stream pollution laboratory, Cincinnati, Ohio.

TANNERY WASTES.

Experiments have been conducted continuously during the year at the tannery of the Deford Co., Luray, Va. This work was brought to conclusion about the end of the year, although it was deemed expedient to maintain the experimental plant in operation in charge of an attendant to make routine analyses of the various tank effluents. The investigation has resulted in a most satisfactory solution of this difficult problem both from the engineering and the stream-pollution points of view. The successful outcome has come to the attention of other tanning companies, one of the largest of which has, upon its own initiative, suggested the cooperation among the tanners in the construction of a full-scale unit further to demonstrate the feasibility of the plan of treatment developed. Negotiations among several of the interested companies are now in progress with every prospect of a satisfactory outcome.

The importance of considering carefully variations in the nature of the wastes derived from various tanneries and the further desirability of studying some of the special collateral problems not requiring immediate solution at Luray, which might, nevertheless, become important at other points, indicated the desirability of establishing a smaller experimental plant under the immediate observation of the laboratory at Cincinnati, which is the headquarters also of stream-pollution studies. This was accomplished early in the spring, and the plant is now operating and the special investigations contemplated are being made. Among these the particular question of color removal from the deeply colored waste tan liquors and the possibility of utilizing the newer activated sludge process now so important in sewage disposal are receiving consideration. A report upon the entire subject is in course of preparation.

STRAWBOARD WASTES.

Investigations of the disposal of strawboard wastes have been conducted at Noblesville, Ind., at the works of the American Strawboard Co. These studies have been brought to a conclusion, and the plant has been dismantled and removed for use in connection with other matters. These investigations have led to a feasible and economic solution of this stream-pollution problem, which is one of considerable magnitude throughout the Middle West. The work has been under the observation not only of the officers of the company interested, but also of the various State officers, particularly the State board of health and the fish and game commission. There has been a general agreement that the degree of purification found possible is satisfactory, and the remedies proposed will not constitute a serious burden upon the industry.

The strawboard company has indicated its intention to construct a full-scale unit along the lines developed in the investigation and has asked the continued cooperation of the service in this matter. It is understood that with the continued satisfactory operation of this unit additions will be made until the plant is of sufficient size to care for the entire wastes of the mill.

CREAMERY WASTES.

A plant for the experimental study of the disposal of creamery wastes was installed during the year at the experimental creamery of the Dairy Division, Bureau of Animal Industry, United States Department of Agriculture, located at Grove City, Pa. Representatives of this division prepared the plans for this plant and have been in charge of its operation.

In connection with this work, a general survey of the creameries in and about Cincinnati is being made, such a survey being desirable to determine whether the wastes of the experimental creamery at Grove City are similar to those found at the ordinary commercial plant.

CANNING WASTES.

Investigations of the treatment of wastes from the various canning industries inaugurated during the last fiscal year were interrupted by the destruction by fire of the canning plant at Farnham, N. Y. Through the assistance of the officials of the National Canners' Association several possible locations where the investigations could be continued were considered, and of these the canning works at Amelia, Ohio, were selected as being, on the whole, most favorable for this work. The experimental plant has been constructed, utilizing for the most part the material brought from Noblesville, Ind. The plant is now ready for operation, which will begin with the opening of the canning season in September.

DISTILLERY WASTES.

The importance of this type of waste water, especially along the Ohio River and its tributaries, early led to consideration of the desirability of some experimental work upon its disposal. It was discovered, however, that there are already in use several methods of treatment, among these being feeding of the wet slop to cattle and vacuum evaporation for the production of a dry feed. It was decided, therefore, as the preliminary step, to make a somewhat extensive study of the efficiency and the economy of the various methods of treatment. A comprehensive report upon this matter, with engineering data, has been prepared.

LABORATORY INVESTIGATIONS.

In addition to the special experimental studies outlined above, the field laboratory at Cincinnati has been engaged in a comprehensive survey of industrial wastes in general, with special reference to securing data on the amount and character of wastes from the more important industries contributing to the pollution of the Ohio River. The data secured are in such form that they may be utilized in determining the extent and character of pollution in other sections, the nature and extent of the industries being stated.

Special investigations have also been conducted with reference to the chemical and biochemical characteristics of these wastes, these matters having important bearing upon the general problem of the self-purification of streams.

Studies have also been conducted upon the diffusion of oxygen through water, an important physical phenomenon having direct bearing on the problem of self-purification.

Sewage-Disposal Studies.

As in previous years, investigations of sewage disposal have been under the general supervision of Prof. E. B. Phelps, of the Hygienic Laboratory, and the immediate direction of Sanitary Engineer L. C. Frank.

RESIDENTIAL AND SMALL COMMUNITY SEWAGE.

Two experimental plants, one at Chevy Chase, Md., and one at the Hygienic Laboratory, have been operated during the year upon many devices for the treatment of residential sewage. This particular problem is distinctly characteristic and unlike the problem of general city sewage disposal. Among other things, it differs in the greater concentration of organic pollution, less regularity of flow throughout the day, greater freshness of the material arriving at the plant, less available head for disposal apparatus, and the impossibility of utilizing either labor or machinery at the plant.

Among the devices investigated are Imhoff tanks; biolytic tanks; an antiscum tank (of new design); sand, contact and trickling filters; and the lath filter. Of these devices the most satisfactory one which has been sufficiently tested is the Imhoff tank-sand filter combination. Under conditions where such an installation is feasible (and these conditions are by no means general), this system may be relied upon to give satisfactory results during warm weather and with some care reasonably satisfactory results in the winter. The final outcome, however, is not at all a complete solution of the problem, first, by reason of the unavailability of the sand in many sections of the country, and, secondly, by reason of a considerable labor item and general poorer results in winter.

Recently the prospects for a more general and satisfactory solution have been improved through studies made with the lath filter, a device originating with the health department of the city of Ontario. This device has not yet been sufficiently studied to warrant its recommendation, but gives every indication of fulfilling the essential requirements of this difficult situation.

SANITARY PRIVY.

Experiments with a new type of sanitary privy as designed and operated at the Hygienic Laboratory have not been entirely satisfactory and a similar privy installed at the service hospital at Jackson, Ky., has completely failed. The laboratory privy has been operated continuously throughout the year, and so far as satisfactory disposal of the materials involved has fulfilled the requirements. It has not been possible to operate it, however, without nuisance in the immediate vicinity, especially during the period of flushing. This design has therefore been abandoned and a modified design embodying the same general principle of biolytic treatment in a deep tank is now being developed.

STERILIZATION OF STEAMBOAT WASTES.

Investigations have continued throughout the year upon a device which will automatically sterilize and discharge the toilet wastes from steam vessels and from railway coaches. Special attention has been given to the vessel matter, as this seems to be of most importance. A full scale apparatus has been constructed and was installed at the sewage pumping station of the District of Columbia through the courtesy of the District engineer of sewers. These experiments led to the development of satisfactory mechanical devices for the operation of this apparatus. It also permitted actual tests upon the bacterial efficiency. These tests demonstrated a high degree of both mechanical and bacterial efficiency.

Arrangements were subsequently made through the courtesy of the president of the Lake Carriers' Association, an organization of the freight steamboat companies of the Great Lakes, and the apparatus was transferred to the steamer *D. G. Kerr*, a cargo vessel of one of these companies. Tests of the mechanical efficiency under actual conditions existing on board were made during several runs of this steamer, and the apparatus was then left in charge of the chief engineer in order to develop any inherent difficulties or uncertainties in its operation. The reports have continued to be satisfactory. It is proposed during the early part of the coming fiscal year to continue observations of the work of this device and to undertake further bacteriological studies of its efficiency under practical conditions. The officials of the Lake Carriers' Association have signified their willingness to install any reasonably economic device of proven efficiency. The actual operation of this plant under the charge of the steamboat officials will be the best possible demonstration for this purpose.

ACTIVATED SLUDGE EXPERIMENTS.

At the close of the calendar year a communication was received from the former chief engineer of the Baltimore Sewerage Commission, now city engineer of the city of Baltimore, stating that the sewerage commission had ceased to exist and that the cooperative arrangement which had been made with the United States Public Health Service would be discontinued. Since that time the experiments begun at Baltimore have been continued without other assistance from the city than the use of the plant itself and some incidental labor.

On the whole, but little progress has been made in the general problem, although valuable experience has been gained in the important phase of the work dealing with the distribution of the air. Toward the end of the fiscal year authorization was granted for the employment of an assistant sanitary engineer and for the continuation of these experiments.

COMPILATION OF LAWS RELATING TO STREAM POLLUTION.

The service has commenced an examination and analysis of laws and court decisions in this country relating to the pollution of navigable waters. This study was conducted during the past year by Research Attorney S. D. Montgomery. The purpose is not only to summarize the powers and duties, active and potential, of the State and Federal Governments as set forth in existing statutes and court decisions, but to trace the common-law principles that have guided and that may be taken as precedents in fixing authority in these matters.

SEWAGE DISPOSAL AT HIGH POINT, N. C.

Upon request of the State Board of Health of North Carolina, Sanitary Engineer H. R. Crohurst made an investigation of the methods of sewage disposal at High Point, N. C., from July 23 to 27, 1915, and reported possible methods of improvement, which were submitted to the State and local authorities. This city, with a population of about 12,000, disposes of its sewage at two points. One outlet is directly into a small creek, with no treatment at all, the other is into another creek, very narrow at the point of the outlet, where the sewage is treated in a septic tank. Because the sewage was highly colored with dye liquors from industrial plants and because of the small amount of diluting water into which the sewage effluent was discharged the city has been involved in several suits brought by farmers on the brooks below the sewer outlets, who claim damage to the water of the brooks and the land bordering them. The investigation by the service indicated that, with the conditions such as existed at the time of inspection, the sewage lost its color in about 3 miles' flow in the brook, the creek being normal below that point. The lower section of the creek, it was found, occasionally overflows its bank, but no offensive conditions due to sewage deposits were discovered.

The report presents three alternatives for improving the conditions in the two creeks. The alternative favored was the following: To extend the present sewers to a point near Carter's Mill, about 2½ miles below the present outlets, to carry these lines high enough so that at some future time purification works can be constructed at this point to treat all of the sewage of the city, and to straighten and widen the creek at certain points below the new outlet. Carter's Mill is below the point where most of the nuisance in the brooks is now said to be, and the ditching below this point should prevent flooding of the meadows, which now seems to be the cause of complaint below this point. Even though the city may have to build purification works at Carter's Mill, the report states, the sewage would not have to be so highly purified as if works were constructed at the present outlets.

SEWAGE DISPOSAL PROJECT AT LEXINGTON, KY.

Following a sanitary survey of Lexington, Ky., made in connection with the studies of pollution of streams (see p. 56), the service directed Passed Asst. Surg. W. H. Frost and Sanitary Engineer R. E. Tarbett to confer with and advise the city authorities relative to plans proposed for sewage disposal. In their report, submitted by the bureau to the local authorities, it was recommended, in view of the desirability of avoiding delay in providing adequate sewage disposal for Lexington and for other reasons, that the wisest course would be to proceed with the construction of a plant in accordance with the recommendations of an engineer employed by the city to submit plans for a sewage-disposal system. His recommendations were for a sewage-treatment plant comprising screens, Imhoff tanks, and sprinkling filters. Dr. Frost and Mr. Tarbett recommended, however, that this plant be constructed, in so far as possible, with a view to adapting it later to the use of the "activated sludge" principle, in case that process, after further trial, appears to justify present expectations.

Leprosy Investigation Station.

On November 3, 1915, the director of the leprosy investigation station at Hawaii, Surg. George W. McCoy, was relieved to become director of the hygienic laboratory. He was succeeded by Surg. D. H. Currie. During the year the personnel of the station was reduced by the discontinuance of the assistant director and one unclassified laborer. One bulletin of the "Studies on Leprosy" series has been issued.

LABORATORY STUDIES.

A number of laboratory investigations have been made during the year. The more important of these may be thus summarized:

1. Autogenous vaccines and biological products from acid-fast bacilli isolated from cases of leprosy have been prepared and used, to ascertain if any of these substances, when given to lepers, tend to

arrest the progress of the disease. As yet no favorable results have been obtained.

2. An investigation was carried on to ascertain what effect, if any, iodine and its salts, which cause a softening of the nodules of lepers, have on the production of leucocytosis when injected into rabbits. No appreciable increase in the number of leucocytes in the animals was observed.

3. Because of the similarity of tuberculosis and leprosy, guinea pigs suffering from tuberculosis were given iodine and its salts, but no beneficial effects were noted.

4. A number of complement deflection tests were made, using various antigens, but chiefly extracts from acid-fast bacilli. The object of these experiments was to discover, if possible, some ready and practical means of early diagnosis in obscure cases of leprosy. Results obtained were not constant enough to indicate that this method could be used in routine diagnosis.

5. A number of studies were made on the growth of *B. lepræ* in symbiosis with other bacteria, and such mixed cultures were used to inoculate some of the lower animals; but these studies were productive only of negative results. A number of animals previously inoculated with leprosy—some of them many months before—were killed and necropsied. No evidence was secured indicating that the acid-fast bacilli obtained directly from leper nodules are capable of infecting laboratory animals.

6. Further attempts to cultivate an acid-fast bacillus morphologically identical with the bacillus of leprosy by the method of Clegg have, in a number of instances, been productive of positive results. On the other hand, attempts at cultivation on ascitic-fluid media and by various methods, such as the addition of Koch's old tuberculin to the leprous material, have failed.

7. A study of Wasserman's reaction with a series of presumably healthy Hawaiians and Hawaiians suffering from insanity in its various forms, in comparison with Hawaiians suffering from leprosy, has been begun.

8. Studies of certain fluid cultures of *B. lepræ* which have been allowed to grow undisturbed for a period of five years (thus offering a possible opportunity for the autolysis of the bacilli) have not, as yet, resulted in securing a substance capable of causing febrile attacks in lepers in the manner that Koch's old tuberculin does in the case both of tuberculous patients and of lepers themselves.

9. Investigations have been begun on laboratory animals to ascertain if a certain copper-cyanide combination, prepared by Prof. Koga, of Kitasato's laboratory in Japan, is curative for tuberculosis in laboratory animals, as claimed.

10. Certain experiments have been conducted to ascertain whether the mechanism of defense of the guinea pig against infections with cultures of *B. lepræ* is cellular or humoral in character. It has been concluded that apparently the most important element in the protection of these animals is the phagocytic action of the leucocyte.

11. Laboratory animals have been inoculated with a tubercle culture of low virulence with the intention of attempting to inoculate them with *B. lepræ* in the coming fiscal year, it being thought possible that their natural immunity might be so weakened by the first

inoculation as to permit the bacillus of leprosy to multiply in their tissues.

12. Certain studies have been made of the histology and bacteriology of a juxtaarticular nodule in a leper. The structure of the nodule was found to correspond to similar nodules described in other portions of the tropical world, and a mold of the genus aspergillus was isolated from this lesion under circumstances which appeared to exclude the probability of it being a contaminating microorganism.

13. Examinations were made of the urines of a number of lepers to ascertain if they showed the presence of either the diazo or urochromogen reactions.

CLINICAL STUDIES.

During the past year 106 cases of leprosy have been under treatment by the staff of the station.

The chief treatment which has been used is chaulmoogra oil by hypodermic injection, as first recommended by Jeanselme, of Paris, and later by Surg. Heiser, of this service. Some of the patients receiving this treatment have shown a little improvement, but it has not been sufficiently marked to indicate that this method is often, if ever, productive of cure. In addition to chaulmoogra oil, a number of other substances have been employed as possible therapeutic agents, including an autogenous vaccine and other biologic products of the acid-fast bacilli, iodine preparations, such as Lugol's solution and potassium iodid, and certain acids or their glycerides isolated from chaulmoogra oil (used hypodermically).

CARE OF PATIENTS AT KALIHI.

In addition to the above experimental treatment the medical officers of this station have had the general care of all the lepers in isolation at Kalihi and have furnished them regularly medical and surgical relief.

PUBLICATIONS.

PUBLIC HEALTH BULLETIN.

75. Studies upon Leprosy.

- XXVIII. Chaulmoogra Oil Treatment of Leprosy. By George W. McCoy.
- XXIX. Carbon Dioxide Snow in the Treatment of Leprosy. By George W. McCoy.
- XXX. *B. Leprae* in the Circulating Blood of Lepers. By Harry T. Hollmann.
- XXXI. Leprosy in a Nineteen Months' Old Child. By William J. Goodhue.
- XXXII. The Cultivation of a Non-Chromogenic Acid-fast Bacillus from a Case of Nodular Leprosy. By Moses T. Clegg.
- XXXIII. A Note Concerning the Favorable Influence of Glucose on the Growth of Acid-fasts. By George W. McCoy.

HYGIENIC LABORATORY.

Personnel.—Surg. John F. Anderson resigned October 14, 1915, and, pending the appointment of his successor, Surg. A. M. Stimson was charged with the administration of the laboratory. Surg. George W. McCoy, the present director, entered upon his duties November 20, 1915.

At the end of the fiscal year the personnel consisted of the director, assistant director, professor of zoology, professor of chemistry, professor of pharmacology, 11 commissioned medical officers, 2 pharmacists, 6 technical assistants, an artist, 2 sanitary chemists, 5 sanitary bacteriologists, 1 sanitary engineer, 1 organic chemist, 4 laboratory aids, and 31 attendants.

Buildings and grounds.—The equipment of the animal house and disinfection rooms has been practically completed. Metal cages have been provided for the supply of animals used in the laboratory investigations.

Demonstrations and exhibits.—Several demonstrations of service work were made at the laboratory to delegates in attendance upon scientific meetings in Washington. The lines of work were so arranged as to give the visitors grasp of the essentials within the short time at their disposal.

Considerable material for a safety-first exhibit held in the National Museum and for the service exhibit on the safety-first train which toured the country was prepared at the laboratory.

The laboratory was thrown open to the American Society of Tropical Medicine during the society's meeting in May. The library was used for holding the sessions, and the use of a lantern and operator was provided. The members of the society were shown the various activities of the laboratory.

Course of instruction.—The course in laboratory technic given service officers was somewhat enlarged upon during the last semester. The course, in immediate charge of Passed Asst. Surg. Hasseltine, began on November 1, 1915, and closed March 1, 1916. In addition to attending lectures and receiving laboratory instruction, each officer was assigned a special problem for study, upon which he prepared a thesis. All branches of the laboratory were called upon for cooperation, members of the staff giving lectures and demonstrations. Lectures were also given the class by several members of the Army and Navy Medical Services, by members of the advisory board, and by various service officers stationed at the bureau and away from Washington.

The class consisted of 10 student officers. In addition, five other public-health workers were extended the facilities of the laboratory for purposes of instruction at various times during the year, as follows: Dr. H. M. Mills and Dr. C. M. Ausley, of the Florida State Board of Health; Dr. C. R. Stingily, of the Mississippi State Board of Health; Dr. Ira C. Ayer, of the Philadelphia Board of Health; and Dr. Frank W. Schofield, of the Provincial Board of Health, Toronto, Canada. It has been a pleasure to offer the facilities of the laboratory to these representatives of public-health organizations.

Assistance to field investigations.—During the year various members of field parties were supplied temporarily with laboratory and office facilities in their studies of sewage disposal, trade wastes, pellagra, rural sanitation, and school hygiene.

AID TO OTHER BRANCHES OF GOVERNMENT.

In a number of instances the laboratory was of aid to several other branches of the Government service during the past year. Aside from the many inquiries and conferences of a routine nature that arise through the interrelation of the Government bureaus, the following may be mentioned:

Sewer department of District of Columbia.—The sewer department of the District government has found it desirable to accumulate data in regard to the pollution of streams in the District of Columbia. As a consequence, the laboratory has examined 288 specimens of water from these streams, many of them being found highly contaminated with the colon organism.

Bureau of Animal Industry.—In connection with an outbreak of foot-and-mouth disease in 1915, the laboratory was called upon to make examinations of several lots of hog-cholera serum, under suspicion of disseminating the infection. The tests were carried out on calves and hogs provided by the Bureau of Animal Industry and covered a period of three weeks.

Post Office Department.—A number of substances were submitted to ascertain whether they were of a poisonous or otherwise dangerous nature. Tests were made in each case and reports submitted to the proper office.

Marine Corps.—A number of disinfectants were tested for the phenol coefficient, as a preliminary to placing a contract for supplies.

Panama Canal.—A standing arrangement has been made whereby the laboratory supplies the first half of one antirabic treatment every month for emergency use on the Isthmus. In addition, several specimens of disinfectants were tested for their phenol coefficients with a view to placing contracts.

Commissioner of Internal Revenue.—Many conferences were held, and opinions rendered, in relation to the enforcement of the narcotic law.

Civil Service Commission.—Members of the laboratory staff, as heretofore, have assisted the Civil Service Commission in providing questions and rating papers in certain examinations for scientific positions.

Army Medical School.—A member of the laboratory staff delivered two lectures before the class of officers of the Army Medical School.

Naval Medical School.—Several lectures and demonstrations were given to members of the Naval Medical School.

Office of Indian Affairs.—Several lots of antityphoid vaccine were supplied for use on various Indian reservations. (See also p. 58.)

AID FROM OTHER BRANCHES OF THE GOVERNMENT.

Aside from matters of merely routine interest, several branches of the Government have extended aid to the laboratory. Among these may be mentioned the Bureau of Standards, the Bureau of Chemistry, the Coast and Geodetic Survey, the Census Bureau, the Geological Survey, the Patent Office library, the Library of Congress, the library of the Surgeon General's Office, United States Army, the Naval Medical School and Hospital, the Smithsonian Institution, and the library of the Department of Agriculture. Particular mention is made of the assistance rendered by the Zoological Park in caring temporarily for monkeys in the intervals between investigations.

LIBRARY.

The total number of bound volumes in the library at the close of the fiscal year was 6,633 and the total number received during the fiscal year 885, including 50 books received from the Carnegie Institution of Washington. Four hundred and twenty-one volumes were received from the Copyright Office, under section 59 of the copyright law of March 4, 1909.

Through the courtesy of the Journal of the American Medical Association and the New York Medical Journal, the library has received over a thousand reprints. A number of doctoral theses have been received from universities.

In addition to the constant use of books and periodicals in the library, 1,947 volumes were issued to borrowers, of which 762 belonged to this library and 1,185 were borrowed from other libraries. Fifty volumes were loaned to other libraries. In several instances, books belonging to the library were forwarded to workers in the field.

During the year, 4,327 printed cards were received from the Library of Congress and incorporated in the card catalogues, making a total of 14,592 printed cards received to date. In addition to the printed cards, typewritten cards have been prepared for reprints and for an index of important articles appearing in the current literature. A record is also kept of important new works bearing upon the activities of the laboratory.

Through a circular letter issued to the health departments, both in the United States and Canada, an effort has been made to secure both the regular reports and the incidental literature issued by these departments. This has met with a very generous response.

DIVISION OF PATHOLOGY AND BACTERIOLOGY.

Both research and routine work of a varied nature have been conducted through this division.

Scarlet fever.—Epidemiological studies on scarlet fever, begun in the spring of 1915 in cooperation with the health officer of the District of Columbia, were continued and a total of more than 600 cases studied. It was observed that, upon the close of the District schools for the summer vacation a marked diminution in the number of cases occurred. Shortly after the opening of the schools in the autumn the number of cases increased. A large amount of data of an epidemiological nature was gathered and the tabulation begun.

Rocky Mountain spotted fever.—As a result of field investigations conducted by Surg. Fricks in the West, notably in Montana, in the spring and summer of 1915 (see p. 266) considerable data and material were collected and brought to the laboratory for study. A strain of the virus was kept running through animals, and studies were made. The results of these observations have been published in the Public Health Reports and issued as Reprint No. 327.

Diphtheria studies.—In connection with the routine examination of diphtheria cultures an opportunity was presented of determining the relative value of pure and mixed cultures in virulence tests. This work indicates that mixed cultures may be used with results that compare favorably with those obtained when pure cultures are employed. A second point demonstrated was the fact that transmission by mail, causing a delay of 24 hours prior to incubation, makes no material difference in the results secured.

Toxicity of preservatives.—A considerable number of experiments have been made to determine the toxicity for mice of various preservatives used in the preparation of serums, etc. Glycerin, alcohol, phenol, and trikresol have been tried separately and in combination with and without serum, but the results thus far obtained are not sufficiently definite to permit of summarization. The fact seems clear, however, that glycerin and alcohol do not reduce the toxicity of phenol.

Researches on tubercle bacillus antigens.—Studies on the reactions produced by tubercle bacillus antigens introduced into rabbits have been instituted. These investigations, which are being conducted by Assistant Director A. M. Stimson, are designed to throw light on immunity processes and variations in this disease.

Examination of specimens.—The past fiscal year has seen a great increase in the number of specimens submitted to the laboratory for examination. The following shows the number and kind of specimens received:

Blood:			
Wassermann test—			
Positive	234		
Negative	836		
Anticomplementary	26		
Specimens not satisfactory	46		
		1,142	
Malaria		2	
Widal test		24	
Malta fever		2	
Complement deviation test of tuberculosis		6	
Count		12	
			1,188
Tissues			33
Feces			202
Urine			59
Sputum			6
Spinal fluid:			
Wassermann test		4[1]	
Tuberculosis		1	
Test for arsenic		50	
			55
Diphtheria cultures and swabs			992

Animal heads examined for rabies:

	Positive.	Negative.	Decomposed.	Total.	
Dog	58	50	13	121	
Horse	--	1	--	1	
Cat	2	8	--	10	
Mule	--	2	--	2	
Cow	4	3	--	7	
Squirrel	--	--	1	1	
Hog	--	5	--	5	
	64	69	14	147	147
Water					503
Miscellaneous					180
Total					3,365

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[1] All negative.

Cultures furnished.—From July 1, 1915, to June 30, 1916, 178 cultures were sent to various workers on their request. A large proportion of these cultures were *B. typhosus*, the Hopkins strain of this organism being used in the testing of disinfectants and the Rawling strain in the manufacture of antityphoid vaccine. Cultures of organisms are given out only to persons or to institutions known to be reliable and actually engaged in scientific investigations.

The laboratory endeavors to keep a stock of the more common organisms, not only for use in the laboratory, but to be supplied to various individuals and institutions engaged in public-health work.

Diphtheria.—An epidemic of diphtheria occurring in Martinsburg, W. Va., late in 1915 (see p. 16), the laboratory was called upon to examine throat cultures of the school children in that city. The cultures were shipped by express and by mail to the laboratory. Telegraphic reports were made of the positive cases.

An outbreak of diphtheria also occurred at the National Training School for Boys and examinations were made of cultures from the throats of the inmates of that institution.

In addition, a number of cultures and swabs were submitted by local health officers in the vicinity of Washington. In all of these cases prompt reports were made.

As a result of the above epidemics, 992 examinations of throat cultures were made at the laboratory during the fiscal year.

Pasteur treatment.—Thirty-six persons received antirabic treatment at the Hygienic Laboratory, and 1,738 complete treatments were cent to State health authorities, as compared with 1,864 in the preceding year. The geographic distribution of the virus is shown in the following table:

Sent to—	Treatments.
Alabama	326
Arkansas	74
Colorado	9
Delaware	3
Idaho	67
Illinois	75
Indiana	116
Iowa	95
Kansas	21
Kentucky	132
Maryland	15
Massachusetts	49
Mississippi	158
Missouri	17
Nevada	114
New York	2
North Carolina	173
North Dakota	5
Ohio	1
Oregon	19
Panama	12
Porto Rico	5
Tennessee	55
Virginia	90
Washington	87
West Virginia	8
Wisconsin	5
United States Army	5
Total	1,738

Distribution of antityphoid vaccine.—An increasing number of Federal employees have taken advantage of the opportunity to receive antityphoid inoculation, 783 injections having been made at the laboratory. During the year 4,641 1-c. c. ampules of the prophylatic were sent to service stations, 1.576 sent for use of service officers on revenue cutters, etc., and 9,073 sent for use in field investigations. The total number of injections prepared was therefore 16.073.

Tuberculosis among Government employees.—Twenty Federal employees were examined for tuberculosis at the laboratory. Ten of these presented positive evidence of the disease and 10 were negative. In the 10 positive cases advice was given looking toward treatment and the prevention of spreading infection.

There is a tendency among Government employees suspected of having tuberculosis to conceal such knowledge from their associates and particularly from official superiors. This is apparently due to fear of losing their positions, or of being isolated and forced to work under unpleasant conditions. As a matter of fact, there is a strong disposition among heads of offices to assist tuberculous employees by assigning them easier work; in several instances transfers have been effected to field positions in climates particularly adapted to the cure of tuberculosis. Were these facts widely known it is believed that many more Government employees would take advantage of the benefits to be derived under the Executive order of February 28, 1906.

Disinfection and disinfectants.—The public interest in disinfection is apparently growing, judging by the number of inquiries received in the past year. These inquiries have originated in all parts of the country and have come not only from manufacturers but from local officials and individuals, as well as from State health authorities.

The inquiries from manufacturers of disinfectants naturally concern their respective products. In many cases direct requests for an official determination of the phenol coefficient have been made. In such instances the practice has been to decline to make the analyses. In a number of instances determinations of phenol coefficients, according to the Hygienic Laboratory method, have been made for State and local officials and the results reported to them, without, however, making any recommendations as to the value of the various products.

The letters of inquiry from householders, merchants, theater owners, and factory superintendents have shown, almost without exception, an earnest desire to secure an efficient product. It is evident, however, that many of the correspondents do not know the difference between a disinfectant and a deodorant.

The laboratory has continued two lines of work on the disinfectant problem. One relates to pine-oil disinfectant (see p. 98) and the other the revision of Public Health Bulletin No. 42.

Journal Club.—During the latter half of the fiscal year fortnightly conferences have been held by members of the division for the discussion of current public health and medical literature.

DIVISION OF ZOOLOGY.

For several years prior to the beginning of the present fiscal year most of the work of the Division of Zoology carried on under the direction of Prof. C. W. Stiles, chief of division, was in the field, in connection with investigations of hookworm disease and studies of the health of school children. The work has now been transferred to the laboratory. A mass of accumulated data has been brought back and a study of these, together with the regular routine, has occupied the attention of the division during the past fiscal year.

International Commission on Zoological Nomenclature.—Cooperation with the International Commission on Zoological Nomenclature, referred to in preceding reports, has been continued, Prof. Stiles serving as secretary of the commission. Despite the delay in the mails, due to the European war, very satisfactory progress has been made in the work. The most important "opinion" issued by the commission this past year is "Opinion No. 67," which places the names of 102 genera of birds in the "Official list" (see Publication 2409, Smithsonian Institution). Several other "Opinions," including names bearing directly upon public-health matters, are now before the commission for final action.

The present policy of the commission in building up an "Official list" of recognized generic names, with the genotypes upon which they are based, is resulting in a much more widespread interest in zoological nomenclature than has existed heretofore and is evidently having a distinct tendency toward bringing the profession together in more harmonious work. The expenses connected with the secretary's office are paid by the Smithsonian Institution.

Index catalogue of medical and veterinary zoology.—This work was interrupted by the fieldwork of the division for several years. This past fiscal year the cooperation with the Division of Zoology, United States Bureau of Animal Industry, has been continued, and the third volume of the subject catalogue will soon be ready for press.

The publication of the first two volumes of the subject catalogue (Bulletins 37 and 85 of the Hygienic Laboratory) has had a marked influence in inducing authors to designate genotypes for their genera and to avoid the introduction of new homonyms and unnecessary synonyms. Formerly authors in medical zoology paid little attention to these important points, and as a result great confusion existed in the literature; in fact, there are several of the common parasites of man that have from 25 to 150 or more names each. With the completion of this series of subject catalogues the outlook is that the confusion in the future will be greatly reduced and specialists all over the world will be saved a great amount of time that would otherwise be lost in useless work.

Determination of zoological specimens.—There is a marked decrease in the number of specimens of parasites of man that are sent in for determination. This fact is undoubtedly due to the improved instruction of medical students on medical zoology that has occurred in the country, and improvement due to no small extent, directly or indirectly, to the efforts of the division.

Studies on hookworm diseases (see p. 18).—While working at the Marine Hospital, Wilmington, N. C., the division prepared a detailed schedule for clinical studies of hookworm patients in order to bring about more uniform records. Sample cases, recorded on these schedules, have been published this past year in various southern medical journals. The system enables readers and compilers to compare the histories of different cases much more readily than is ordinarily the case.

In former reports[1] reference has been made to an intensive field study of 115 school children, all but 23 of whom had hookworm infection, in the county of Z—. During this past fiscal year the compilation of the collected data has been nearly completed.

The mental studies by Prof. E. K. Strong, jr., working from the psychologist's point of view and the studies of the Division of Zoology from the physical point of view, brought out the following facts:

The mental tests show that the group of normal (noninfected) children (group A) occupied first place in mental advancement from the first to the last tests. If this improvement for group A be taken as 100 per cent the improvement in the other groups may be expressed in the following figures:

Group B (hookworm children who were not treated) improved least mentally, making an advancement of only 34 per cent, namely, about one-third as much as that made by group A.

Group C (children who were completely cured of their hookworm infection) improved almost double as much as did the nontreated (34 per cent) hookworm children and three-fifths (60 per cent) as much as did the noninfected.

Group D (a hookworm group with severer infection than that shown by C and one which was treated but not completely cured) made (38 per cent) only a slightly greater improvement than the apparently more lightly infected but untreated group B (34 per cent) and considerably less improvement than that (60 per cent) made by the less severely infected but completely cured group C.

An older subgroup (Du) of treated but incompletely cured severer cases improved only 9 per cent as much as the normal children (100 per cent) and very much less than the untreated younger children (B, 34 per cent). This latter fact seems to emphasize the serious aspect of allowing hookworm infection to go untreated, for it seems to indicate that prolonged infection may produce prolonged effects upon mentality.

This investigation by psychologists bears out the claims advanced but not measured by physicians and zoologists that the effect of hookworm infection may result in serious delay in development of mental activities of children and of communities and may therefore have a seriously inhibitive effect upon the school problems and even upon the economic development of hookworm communities.

It emphasizes more than does any previous study the advisability of prompt medical treatment, even of light cases, for the benefit of the children themselves and collectively for the better development of the community.

The fauna of sludge.—In connection with the studies of the Division of Chemistry on sewage disposal, studies have been commenced upon the animal life of sludge, but they have not progressed to a point that warrants report.

Public health aspect of nematodes in fishes.—This past year the market for butterfish was considerably disturbed because of the condemnation of some fish by the local board of health in a large city on account of the presence of certain small roundworms, and the United States Fish Commission requested an opinion from the Public Health Service in respect to the nature of the parasites and the probability of their communication to human beings through the eating of butterfish. The Division of Zoology studied and reported on the subject, the main conclusions being that—

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[1] See, for instance, Annual Report for 1915, United States Public Health Service, p. 18.

(1) The parasitic worms from the butterfish submitted for examination and opinion represent a larval (agamic) ascarid.

(2) It does not agree with any parasite that is recognized as cause of disease in man.

(3) There is no evidence that it would come to maturity in man, even if the ascarid reached the human stomach in uninjured condition and viable.

(4) Most of said parasites seem to occur on the viscera of the fish, and since the viscera are removed before the fish is cooked the number of ascarids that might eventually reach the human stomach is enormously reduced.

(5) Since the butterfish are cooked before being served as food, those agamic ascarids that happen to be present in the flesh or under the parietal peritoneum would be cooked before being swallowed; hence they would not be infectious.

(6) No evidence is available that any case of disease in man has ever been caused by these small parasites.

DIVISION OF PHARMACOLOGY.

Prof. Carl Voegtlin, chief of the division of pharmacology, has personally directed the laboratory studies on pellagra at Spartanburg, S. C., during the past fiscal year.

Isolation of vitamine from brewers' yeast.—The importance of securing adequate amounts of reasonably pure vitamine for physiological studies has been recognized for some time and a large amount of work has been done along this line. The earlier experiments yielded products of very complex and uncertain nature. It was later found, however, that fuller's earth acts toward vitamine in much the same manner as it had previously been shown by Lloyd to act toward alkaloids in aqueous solution—that is, it exerts a selective adsorption for vitamine and removes it completely from a solution containing a very great preponderance of other substances. The procedure that has finally been worked out for brewers' yeast consists in first pressing the yeast to remove the beer and in then allowing the cake to autolyze at 37.5 C. The resulting thick liquid is filtered, and to the clear filtrate fuller's earth is added and, after a short period of contact, removed by filtration, washed, and dried. It has been found that under these conditions all of the vitamine originally present in the yeast solution adheres to the solid fuller's earth and retains its characteristic physiological properties for relatively long periods. This solid is therefore considered to be a combination of nearly pure vitamine and an inert inorganic material. The product can be made in quantities and can therefore be subjected to as thorough a clinical test as may be desired.

Although the solid combination of vitamine and fuller's earth may be found of value as an adjunct to deficient diets, it has appeared desirable to attempt to separate the vitamine from the fuller's earth and obtain it in a stable free form. The experiments along this line have so far resulted in the isolation of the vitamine in a physiologically active condition, but not in a pure and stable form. Analyses have clearly indicated the character of the vitamine compound. There appears to be no doubt that the active substance is an isomer of the purine base known for some time as adenine.

Since it was found that fuller's earth possesses this valuable property, it appeared desirable to ascertain if some substance which could be easily removed and therefore leave behind the pure vitamine might not exert a similar action. Experiments were consequently made with a number of resins capable of yielding colloidal precipitates and it was found that mastic was the most suitable of the several resins tested. With the aid of mastic, active preparations of vitamine have been prepared from brewers' yeast and forwarded to Spartanburg for further concentration.

Some time has been spent on experiments to determine the nature of the supposed mother substance with which vitamine is thought to be combined in the natural state. These experiments have included extraction of the freshly pressed yeast with alcohol and salt solutions and the digestion of the fresh yeast with chloroform in presence of solid calcium carbonate. The solutions obtained in this way were subjected to dialysis, the material left behind in the collodion sacks, coagulated, the coagulant filtered off and hydrolyzed with dilute acid, and the resulting products tested for the presence of vitamine. These experiments have not yielded results from which positive conclusions could be drawn.

A report covering a part of this work was published in the Public Health Reports and issued as Reprint No. 325.

In addition to the above-mentioned investigations large quantities of concentrated yeast products have been prepared. These have included 917 pounds of dried yeast, about 50 pounds of vitamine activated fuller's earth prepared by the process described above and by a modification of that process, various mastic preparations, and products obtained in the course of the experiments on the mother substance of vitamine.

Toxicity of heavy metals.—The investigation of the toxicity of the lactates and thioglycolates of an extensive series of heavy metals, which, as mentioned in the last annual report, had been under way for some time, was brought to a close in October. The results have been collected and prepared for publication and furnish interesting and useful data on the comparative toxicity of heavy metals. Of the large number of compounds tested on animals infected with trypanosomes, antimony potassium lactate alone was found to be effective, and in this case no striking advantage over other previously investigated antimony salts was noted.

Standardization of drugs.—By means of the chemical standard, beta-iminazolylethylamine, recently proposed for determining the strength of pituitary extracts, and now adopted for the United States Pharmacopœia, comparative studies of extracts obtained from a variety of mammals have been made. The pituitary bodies of cattle, horses, hogs, cats, dogs, and rabbits were used and it was found that they differed only in their quantitative effects and not qualitatively. The extracts from cats, dogs, and hogs were more active than those from the other animals. This data should be of value to the manufacturers of this product. In addition an examination was made of recently manufactured commerical preparations obtained from those firms whose products had been previously examined. A marked variation in the activity of the several preparations was again found.

Toxicity of aluminium.—The studies referred to in the previous annual report undertaken to ascertain the toxicity of aluminium in animals were concluded and the data prepared for publication in bulletin form.

Examination of life-saving device.—In conjunction with Surgeon Schereschewsky an examination was made of the life-saving device called the "lung-motor." This device was examined from a mechanical standpoint as to its usefulness in resuscitating the apparently drowned and the asphyxiated. It was found that in some respects the device is superior to manual methods in the resuscitation of the drowned, but it was not deemed sufficient to depend upon it entirely, its greatest field of usefulness being as a supplementary aid to manual methods.

Cocaine substitutes.—A study is now under way to determine the general effects and the proper classification of some of the more recently introduced cocaine substitutes. The determination of the toxicity of novocaine together with the investigation of its general systemic action was determined in animals. It was found that in large doses novocaine lowers the blood pressure markedly. The cause of the death in experimental animals from novocaine poisoning was found to be due largely to the depression of the respiration. Cardiac depression was also shown to be a contributory factor. From these findings novocaine should not be given in cases of low blood pressure or in myocardial weakness or respiratory disturbances.

Novocaine was found to be relatively less toxic than cocaine under certain conditions, but under other conditions there is relatively little difference in the toxicity of cocaine and novocaine.

Digest of comments on United States Pharmacopœia and on the National Formulary.—The preparation of material for the Digest of Comments has been continued, and during the last year Hygienic Laboratory Bulletin No. 105, including a compilation of the comments for the calendar year ending December 31, 1914, was published. The material for an additional volume for the year ending December 31, 1915, is now in the course of preparation.

Pharmacopœia of the United States and the National Formulary.—The cooperative work in connection with the revision of the Pharmacopœia of the United States and the National Formulary has been continued during the year. Both of these books were issued soon after the close of the fiscal year. In compliance with the precedent established in connection with the eighth decennial revision of the Pharmacopœia of the United States there has been prepared in this division and submitted for publication an epitome of the changes in the Pharmacopœia and the National Formulary.[1] The bulletin will contain information not otherwise available and should be of practical interest to all who are in any way compelled to use or to refer to the legal standards for drugs and medicines either from a medical or legal point of view.

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[1] Hygienic Laboratory Bulletin No. 107.

Council on pharmacy and chemistry.—The cooperative work in connection with the council on pharmacy and chemistry of the American Medical Association has been continued, and members of the division have assisted in the compilation and revision of the book "New and Nonofficial Remedies," a revised edition of which was published in January, 1916, in the revision of the list of Useful Drugs, and in the compilation of an epitome of the Pharmacopœia and the National Formulary.

Digest of laws and regulations relating to poisons and habit-forming drugs.—A compilation of the laws and regulations relating to the sale, use, and manufacture of poisons and habit-forming drugs, enacted during 1914 and 1915, now in force in the United States, was prepared and, with critical comments in the form of an introduction, was published in the Public Health Reports and subsequently issued as Reprint No. 330. This reprint reproduces laws and regulations enacted in 48 of the States, Territories, and possessions of the United States. A discussion of recent legislation designed to restrict the use of narcotic drugs was published in the Reports and issued as Reprint No. 321; a short article on the sale and use of poisons was published in the Reports of February 18, 1916.

Toxicity of drugs.—In addition to the above, a study is being made of the untoward and secondary actions of drugs as recorded in the current literature and an index of the articles relating to the subject is being compiled. For use as a basis for future legislation relating to the sale and distribution of poisons the Bureau of the Census has agreed to prepare in the future detailed reports recording the deaths from suicide by poisoning and the deaths from accidental poisoning in the registration area. Some indication of the value of such a compilation is obtained by reference to the tables printed in Reprint No. 330 from the Public Health Reports, giving the data for the year 1909, the one period for which these data are available up to the present time.

Cosmetics as drugs.—A short paper by Technical Assistant Martin I. Wilbert on "Cosmetics as Drugs," published in the Public Health Reports and issued as Reprint No. 305, reached the following conclusions: That the presence of wood alcohol in cosmetics and other preparations for the human body should be prohibited by law; that salts of the heavy metals may be absorbed from cosmetic preparations and produce their characteristic constitutional effects; that to prevent serious intoxications, cosmetics should be classed as drugs, and it should be necessary to state on the label the name of any poisonous ingredient used.

Pan-American laws relating to poisons and narcotics.—In reply to a number of inquiries an effort is being made to compile the laws relating to the manufacture, sale, and use of poisons and narcotic drugs now in force in the several foreign countries of North and South America. The laws in force in the British colonies of America, the Dutch colonies, the French colonies, and in several of the Spanish-American countries of Central America, have been secured and abstracted. This material has already been of use as a source of information for replies to inquiries that have come in from time to time, and it is expected that when completed these laws will be of exceptional interest in that they will reflect conditions as they exist in the several countries of North and South America.

Influence of ethyl alcohol on phenol.—Experiments on animals conducted at the laboratory show that the addition of ethyl alcohol to solutions of phenol (carbolic acid) in water does not, in any way, inhibit the toxic action of phenol, but rather tends to facilitate absorption and thus hasten death. These experiments were reported in the Public Health Reports of April 28, 1916. (Reprint No. 336.)

Miscellaneous analyses and examinations.—In connection with studies on the effect of milling on the vitamine content of cereals, phosphorus determinations have been made from time to time during the year on a very large number of samples. Another extensive series of samples has been miscellaneous body fluids collected by Dr. Barbat, of San Francisco, from patients to whom arsenobenzol compounds had been administered. More than a hundred determinations of arsenic were made in these samples.

Aid to other departments of the Government.—Samples of Novol and of Dr. Tucker's Asthma Cure have been analyzed for the Bureau of Internal Revenue; copper sulphate pencils for the Commissioner of Indian Affairs; poisoned barley for the Victor, Mont., laboratory; samples of drugs for the purveyor of this service, and miscellaneous samples from individuals.

DIVISION OF CHEMISTRY.

Prof. E. B. Phelps has continued in charge of the division and has also acted as sanitary advisor to the international joint commission.

The work of the division has comprised original investigations and researches along various public health lines; routine examination of samples and materials, including the analytical studies necessary in connection with certain field investigations; the preparation of special memoranda and reports upon matters submitted; special investigations made at the request of other bureaus of the Federal Government; assistance rendered the United States Civil Service Commission in the preparation of examinations and a correction of papers, and miscellaneous activities.

Routine examinations.—Under the classification of routine examinations and reports, the following work has been done: Sewage and sewage effluents, 963; water examinations made for officials of the District of Columbia, 105; drug assays for the purveying depot, 15; miscellaneous specimens examined, 101, making a total of 1,184. Three examinations have been prepared and the papers of applicants corrected. A special examination and laboratory study has been made for the Bureau of Labor Statistics, Department of Labor, to determine the volatility of lead and other metals from molten type metal under conditions existing in the Government Printing Office. A special examination and report has been made of an electrical apparatus for the sterilization of drinking water upon a small scale. Plans have been prepared and submitted to the bureau for a small milk pasteurizing outfit suitable for use in hospitals. A special report has been prepared upon the various methods for the fixation of atmospheric nitrogen.

Diffusion of dissolved oxygen through water.—Work upon this investigation has been carried on from time to time as opportunity permitted, its purpose being the determination of an important physical constant which is involved in studies of reaeration and self-purification of streams.

Comfortimeter.—These studies are the direct outgrowth of an earlier investigation completed last year at the Hygienic Laboratory relative to the various physical factors which determine the rate of heat loss from the body. The three important variables to be considered are the temperature, humidity, and velocity of movement of the air. A satisfactory mathematical formulation of the law involving these three variables having been arrived at, it seemed desirable to design a simple instrument for the quantitative measurement of the combined effect of all these properties of the air in one single value. Several pieces of apparatus have been constructed and tested and these studies have involved a complete investigation into the measurement of air currents and the conditioning of air. An apparatus has finally been designed which seems to fulfill the imposed conditions and the final work of calibrating this against actual comfort of individuals is now in process.

Theory of disinfection.—In connection with a general study being made by a committee of the American Public Health Association upon standard procedures for testing disinfectants, it has seemed important to investigate the fundamental laws underlying the action of disinfectants upon bacteria. Previous investigations have indicated certain fixed relations tending to emphasize the purely chemical nature of the reactions involved. This matter is being thoroughly investigated with a view to establishing a more scientific basis for the actual testing of disinfectants and with a broader object of determining the biochemical relations involved.

Preparation of a new liquid disinfectant.—Studies have been continued throughout nearly the whole fiscal year with the view to developing formulas for one or more liquid disinfectants utilizing for this purpose substances commercially available in sufficient quantities and at suitable price. This work has been largely focused upon the use of pine oil, a distillate from pine wood, and a paper on the subject by Sanitary Chemist A. F. Stevenson (Reprint No. 304) has been published. Since the publication of this formula, however, the cost of crude pine oil has increased to such an extent that one of the chief advantages of this disinfectant, that of low cost, has to a large extent been lost.

A complete and more scientific paper is in course of preparation, giving in detail all the studies carried out with a number of substances and complete results of the investigations.

Determination of minute quantities of antimony.—This research, which was begun during the last fiscal year, has been brought to a satisfactory conclusion and, according to Prof. Phelps, it is possible, by the methods developed, to separate and determine minute quantities of antimony in the presence of allied metals. The sensitiveness of this test is far greater than any quantitative test which has heretofore been applied.

Determination of nitrates in sewage filter effluents.—This study, which was likewise begun during the last fiscal year, has been completed and the results presented before the American Chemical Society.

Investigation of muscicides and other fly-destroying agencies.—The possible danger involved in the use of arsenic solutions as fly poisons has on several occasions been referred to the bureau. Information furnished in this connection has indicated a considerable number of deaths from the accidental drinking of arsenic solutions, generally by children, these deaths amounting, according to an editorial of the West Virginia Medical Journal, to 22 in 12 States of the United States during the summer of 1915. It was furthermore believed, according to this journal, that the record is quite incomplete, and as the symptoms of arsenical poisoning are said to be similar to those of cholera infantum, it is of the opinion that many faulty diagnoses have been made in the past. The present investigation has been undertaken along two distinct lines, first, the determination of the relative value of other muscicides not injurious to man as compared with arsenic preparations and, second, a study of sticky fly papers and allied preparations.

Of the large number of substances tested, several have yielded satisfactory results. It has been found that dilute formaldehyde solutions are perhaps the most satisfactory muscicides for general use, and that for the best results the concentration should not exceed 1 per cent. For household use as an added safeguard, a one-half per cent solution, which has practically the same efficiency, is to be recommended. A fact not hitherto commented upon is the decrease of efficiency of solutions stronger than 1 per cent formaldehyde. Of almost equal efficiency and perhaps even more desirable in the household is a 1 per cent solution of sodium salicylate with the addition of brown sugar. This manuscript is being prepared for early publication.[1]

Detection and approximate measurement of dilute hydrocyanic acid gas in air.—An attempt has been made to devise a simple method for the detection and rough measurement of that concentration of hydrocyanic acid gas in the air which it is believed represents the minimum concentration capable of unfavorable action upon human beings. For this purpose reagents of tincture of guaiac and sulphate of copper have been found suitable and investigations have shown that the sensitiveness of the test can be altered throughout a considerable range by modifying the propositions of the two reagents. Further work requires to be done upon this method before it may be employed in connection with disinfection procedures.

Determination of hydrogen ion concentration.—The division has been equipped during the year with apparatus for the determination of hydrogen ion concentration by the potentiometer method, and much time has been spent in operating and calibrating this apparatus. It has already been of use in connection with studies of methods of testing disinfectants and in connection with the routine work of the division.

PUBLICATIONS.

A list of Hygienic Laboratory Bulletins, with summaries of their contents, is given on page 357 of this report. In addition certain other publications of the service related specifically to Hygienic Laboratory work.

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[1] Public Health Bulletin No. 108.

REPRINTS FROM PUBLIC HEALTH REPORTS.

289. **Post-Vaccination.** Studies on its relation to vaccine virus. By John F. Anderson. July 16, 1915. 5 cents.
292. **Embalming.** Indefinite preservation of the body. By Edward Francis. July 30, 1915.
294. **The Number and Kind of Drug Addicts.** By Martin I. Wilbert. August 6, 1915. 5 cents.
297. **The Pharmacy of Useful Drugs.** By Martin I. Wilbert. August 27, 1915. 5 cents.
304. **An Efficient Liquid Disinfectant.** A formula by which one can be readily prepared. By Albert F. Stevenson. October 8, 1915. 5 cents. **Exhausted.**
305. **Cosmetics as Drugs.** A review of some of the reported harmful effects of the ordinary constituents of widely used cosmetics. By Martin I. Wilbert. October 15, 1915. 5 cents.
321. **Narcotic Drugs.** Recent legislation designed to restrict their use. By M. I. Wilbert. January 21, 1916. 5 cents.
330. **Poisons and Habit-Forming Drugs.** A digest of laws and regulations relating to the possession, use, sale, and manufacture of poisons and habit-forming drugs enacted during 1914 and 1915, now in force in the United States. By Martin I. Wilbert. February 18 to March 24, 1916. 20 cents.
334. **Biological Products.** Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. April 14, 1916. 5 cents. **Exhausted.**
336. **Some Fallacies Regarding Phenol.** A review with reports of observations on the influence of ethyl alcohol on the germicidal and on the toxic properties of phenol. By Martin I. Wilbert. April 28, 1916. 5 cents.

PUBLIC HEALTH REPORTS.

July 30, 1915. Paralysis during antirabic treatment. Report of two cases of paralysis, with one death, occurring during the course of antirabic treatment. By H. E. Hasseltine.

February 18, 1916. **Sale and use of poisons.** By M. I. Wilbert.

February 25, 1916. **Methyl alcohol.** Recent legislation to restrict its sale and use. By M. I. Wilbert.

March 3, 1916. **Sale and use of intoxicating liquors.** By M. I. Wilbert.

March 10, 1916. **Sale and use of cocaine and narcotics.** By M. I. Wilbert.

March 17, 1916. **Publicity of formulas of package medicines.** By M. I. Wilbert.

March 24, 1916. **Occupational intoxications.** By M. I. Wilbert.

Advisory Board of Hygienic Laboratory.

Valuable assistance was rendered by the advisory board and by individual members of the board during the fiscal year just ended. Several important questions arose concerning the work of the laboratory upon which the advice of the board was urgently needed. Notable among these was the problem presented by the growth of the biologics industry. It was strongly felt that some steps should be taken looking to an expansion of the facilities for making more frequent inspections and examinations of these products, and the advice of the advisory board was secured.

The board recommended very strongly the extension of the investigations on rural sanitation, school hygiene, industrial hygiene, and the pollution of coastal waters.

It is gratifying to state that, at all times, the members of the board have shown an active interest in the welfare of the laboratory. This has been expressed by a number of lectures delivered to the officers and personnel of the laboratory, and by many informal conferences and exchanges of correspondence. Most of the members have also left their own work and responded to calls for formal conferences. The suggestions received at various times have been of unusual value and assistance.

VIRUSES, SERUMS, TOXINS, AND ANALOGOUS PRODUCTS.

Enforcement of law.—In the enforcement of the law of July 1, 1902, regulating the sale of viruses, serums, etc., 55 inspections of establishments were made, the licenses of 23 establishments were renewed, and 4 new establishments were granted licenses for the first time. In three cases licenses were refused, and in another case the establishment withdrew its application. Two licenses were revoked and two suspended for various causes. At the termination of the fiscal year 42 establishments (27 American and 15 foreign) were holding licenses. The complete list has been published in the Public Health Reports of April 14, 1916, and also issued as Reprint No. 334.

During the year a total of 5,187 samples of products were examined at the Hygienic Laboratory, showing an increase of 167 per cent over the number examined the previous year and an increase of 466 per cent over the number examined during the fiscal year 1914.

During the year, in accordance with recommendations made by the board specified in section 4 of the act of July 1, 1902, the form of the blank used for licensing establishments was changed in order to provide sufficient space for the enumeration of all the products licensed, which has increased tenfold since the law was enacted. The board recommended for this purpose the amendment of paragraphs 4 and 5 of the regulations approved May 11, 1909. This recommendation was approved by the Secretary of the Treasury April 11, 1916, and the regulations modified accordingly.

Testing of antityphoid vaccine.—Owing to the fact that there is at present no efficient potency standard for this product, investigations have been undertaken looking to the establishment of such a standard. This problem was taken up early in April, 1916, and considerable data bearing upon the work have already been collected. The experiments and observations required in arriving at a proper standard will necessarily run into the next fiscal year. This investigation has shown a very considerable variation in the potency of commercial vaccines and of those prepared by the various State laboratories.

In view of these results and pending the establishment of a standard, a circular letter was addressed to all licensed manufacturers advising the testing of each lot of antityphoid vaccine on rabbits to determine its agglutination properties and also suggesting the use in the manufacture of this product of a strain of *B. typhosus* of known immunizing properties.

Need for specific fund.—The need of a specific fund for the enforcement of the law regulating the manufacture and sale of biological products has long been felt and referred to in various annual reports. The appropriation of a sum of $10,000 for this purpose during the fiscal year 1917, while only a fifth of the amount recommended by the advisory board of the Hygienic Laboratory and less than one-third of the amount estimated for, will enable the service to maintain a more adequate supervision over these products, the use of which is daily becoming more extended. A larger appropriation will, however, be necessary in order to employ the personnel and take the measures necessary to make this supervision thoroughly effective.

SPECIAL AND FOURTEENTH ANNUAL CONFERENCES OF STATE AND TERRITORIAL HEALTH AUTHORITIES.

Special conference.—In response to requests from the State health authorities of California, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming, a special conference of State and Territorial health authorities was held with the service at Salt Lake City, Utah, on February 2 and 3, 1916. Nine States and the District of Columbia were represented. The special subject under discussion was rabies, but Rocky Mountain spotted (or tick) fever, migration of tuberculous persons, railroad sanitation, and intrastate quarantine regulations were also taken up. Several resolutions in regard to the control of rabies and other matters discussed at the conference were adopted and will be found, together with the complete transactions, in Public Health Bulletin No. 80.

Annual conference.—The fourteenth annual conference of these health authorities with the service was held in Washington on May 13 and 15, 1916. Twenty-eight States and the District of Columbia were represented. The following subjects were discussed: Codification of sanitary regulations for intrastate use, health insurance, pellagra, morbidity reports, collaborating epidemiologists, industrial sanitation, "sanitation week" observance, malaria, constitutional diseases, school hygiene, rural sanitation, standard methods of collecting public-health information, and establishment of an "area of known disease prevalence."

Resolutions adopted by the conference, in addition to routine matters, indorsed the principles of health insurance operated under governmental systems, favored the creation of a registration area of known disease prevalence, declared that the sanitation of schools and the protection of the health of school children should devolve on health authorities, and indorsed the use of a properly balanced diet as the only method now known by which pellagra may be successfully combated.

The transactions of the annual conference will be published as Public Health Bulletin No. 82.

REPRESENTATION AT MEETINGS OF SCIENTIFIC AND SANITARY ASSOCIATIONS AND CONGRESSES.

During the year the service was represented at the following meetings:

Conference of Municipal and Parish Health Officers, New Orleans, La., July 15–16, 1915.

American Genetic Association, Berkeley, Cal., August 3–6, 1915.

American Pharmaceutical Association, San Francisco, Cal., August 9–13, 1915.

Conference of Health Officers, Seattle, Wash., August 17–18, 1915.

Joint Conference of First Aid, Accident Surgery, and Transportation, Washington, D. C., August 23–24, 1915.

Homeopathic Medical Society of the State of Pennsylvania, Buena Vista Springs, Pa., September 7–9, 1915.

American Public Health Association, Rochester, N. Y., September 7–10, 1915.

Annual Conference of State, County, and Municipal Health Officers, Oakland, Cal., September 8, 1915.

Association of Military Surgeons of the United States, Washington, D. C., September 13–15, 1915.

Illuminating Engineering Society, Washington, D. C., September 20–23, 1915.

Missouri Valley Public Health Association, Kansas City, Mo., September 28–29, 1915.

Utah State Medical Association, Salt Lake City, Utah, September 28–29, 1915.

Mississippi Valley Conference on Tuberculosis, Indianapolis, Ind., September 29–October 1, 1915.

Fourth National Housing Conference at Minneapolis, Minn., October 6–8, 1915.

South Texas District Medical Association, Nacogdoches, Tex., October 7–8, 1915.

American Social Hygiene Association, Boston, Mass., October 8, 1915.

Second Annual Southern Tuberculosis Conference, Columbia, S. C., October 8–9, 1915.

World's Insurance Congress, San Francisco, Cal., October 12, 1915.

Association of Railroad Chief Surgeons, Chicago, Ill., October 12, 1915.

National Safety Council, Philadelphia, Pa., October 18–21, 1915.

National Association for the Study and Prevention of Pellagra, Columbia, S. C., October 21–22, 1915.

Clinical Congress of Surgeons of North America, Boston, Mass., October 25–30, 1915.

Southern Medical Association, Dallas, Tex., November 8–11, 1915.

American Association for the Study and Prevention of Infant Mortality, Philadelphia, Pa., November 10–12, 1915.

Conference on the Prevention of Mosquito-borne Diseases, Department of Health, New York City, November 17, 1916.

Arkansas Conference for Health Officers, Little Rock, Ark., November 23–24, 1915.

Society of Clinical Surgery, Washington, D. C., November 26 and 27, 1915.

Conference for Health Officers, Elkins, W. Va., November 30, 1915.

Alameda County Dental Society, Oakland, Cal., December 1, 1915.

Seaboard Medical Association, Norfolk, Va., December 7, 1915.

Conference of Health Officers, Louisville, Ky., December 8–10, 1915.

Southwest Medical and Surgical Association, El Paso, Tex., December 9–11, 1915.

American Medical Society for the Study of Alcohol and Other Narcotics, Washington, D. C., December 15–16, 1915.

Conference of Health Officers, Richmond, Va., December 16, 1915.

Southern Commercial Congress, Charleston, S. C., December 16, 1915.

Second Pan American Scientific Congress, Washington, D. C. December 27, 1915; January 8, 1916.

American Association for Labor Legislation, Washington, D. C., December 28–29, 1915.

American Society of Bacteriologists, Urbana, Ill., December 28–30, 1915.

American Association for the Advancement of Science, Columbus, Ohio, December 31, 1915, to January 1, 1916.

Conference of Medical Missions, New York, N. Y., January 8–15, 1916.

National Safety Council, Chicago, Ill., January 24, 1916.

Conference of Charities and Corrections of Maryland, Annapolis, Md., January 25, 1916.

Mississippi Health Officers' Conference, Jackson, Miss., January 25–26, 1916.

Nebraska Public Health Association, Omaha, Nebr., January 25–26, 1916.

Indianapolis Medical Society, Indianapolis, Ind., February 1, 1916.

Conference of State Health Authorities, Salt Lake City, Utah, February 2, 1916.

Indiana Sanitary and Water Supply Association, Indianapolis, Ind., February 3–5, 1916.

Indiana Engineering Society, Indianapolis, Ind., February 3–5, 1916.

Conference on Mental Hygiene, Indianapolis, Ind., February 4, 1916.

Council on Medical Education and on Health and Public Instruction, American Medical Association, Chicago, Ill., February 7–8, 1916.

Federation of State Medical Boards, Chicago, Ill., February 7–8, 1916.

Association of American Medical Colleges, Chicago, Ill., February 7–8, 1916.

Council on Pharmacy and Chemistry, American Medical Association, Chicago, February 19, 1916

Missouri Valley Medical Society, St. Joseph, Mo., March 23–24, 1916.

Southeastern Sanitary Association, Brunswick, Ga., March 23–24, 1916.

Tennessee State Medical Association, Knoxville, Tenn., April 3–6, 1916.

South Texas District Medical Association, Houston, Tex., April 6–7, 1916.

Southern Sociological Congress, New Orleans, La., April 12–16, 1916.

Southwest Missouri Mine, Safety & Sanitation Association, Joplin, Mo., April 15, 1916.

Committee on Industrial Hygiene, New York City, April 17, 1916.

Society for the Study of Mental Defectives, New York City, April 17, 1916.

American Chemical Society, Urbana, Ill., April 18–21, 1916.

Alabama Medical Association, Mobile, Ala., April 20, 1916.

Cleveland Academy of Medicine, Cleveland, Ohio, April 21, 1916.

Arizona Health Officers' Association, Phoenix, Ariz., April 24, 1916.

Conference of Local Health Officers, Rosedale, Kans., April 24–29, 1916.

Arizona State Medical Society, Phoenix, Ariz., April 26–27, 1916.

Virginia Public Health Association, Newport News, Va., May 8–9, 1916.

American Association for Promoting Hygiene and Public Baths, Baltimore, Md., May 9–10, 1916.

State Medical Association, Galveston, Tex., May 9–11, 1916.

American Society of Tropical Medicine, Washington, D. C., May 9–11, 1916.

Florida Medical Association, Arcadia, Fla., May 10–12, 1916.

National Conference of Charities and Corrections, Indianapolis, Ind., May 10–17, 1916.

National Association for the Study and Prevention of Tuberculosis, Washington, D. C., May 11–12, 1916.

West Virginia Medical Association, Wheeling, W. Va., May 17, 1916.

Ohio State Medical Association, Cleveland, Ohio, May 17–19, 1916.

Conference of Pennsylvania Physicians Engaged in Industrial Practice, Harrisburg, Pa., May 19, 1916.

Hennepin County Medical Society, Minneapolis, Minn., June 3, 1916.

Association of Medical Milk Commissions, Cincinnati, Ohio, June 9–10, 1916.

Council on Pharmacy and Chemistry, American Medical Association, Chicago, Ill., June 9–10, 1916.

American Academy of Medicine, Detroit, Mich., June 9–14, 1916.

American Association of Industrial Physicans and Surgeons, Detroit, Mich., June 12–13, 1916.

American Medical Association, Detroit, Mich., June 12–16, 1916.

New Jersey Medical Society, Asbury Park, N. J., June 21, 1916.

American Institute of Homeopathy, Baltimore, Md., June 29, 1916.

Educational Lectures on Public Health.

Mention has been made under different headings of the educational lectures on public health delivered by officers of the service in the course of investigations of rural sanitation, malaria, pellagra, trachoma, school hygiene, mine sanitation, etc.

In addition a number of popular addresses were presented, in many cases without expense to the service, before miscellaneous audiences, as follows:

State Farmers' Convention, West Raleigh, N. C., August 26, 1915.

American Red Cross, first-aid lectures to seamen of the Merchant Marine, August 28, 1915.

Farmers' meetings, Washington, N. C., and vicinity, August 30–September 14, 1915.

Southwest Missouri Mine, Safety, and Sanitation Association, Webb City, Mo., September 23, 1915.

Sanitation Day Exercises, Fredonia, Kans., October 5, 1915.

Public Health Meeting, Oakland, Cal., October 17, 1915.

Employers' Meeting, Milwaukee, Wis., November 14, 1915.

University of Mississippi, Jackson, Miss., November 29, 1915.

New Jersey Sanitary Association, Lakewood, N. J., December 3 and 4, 1915.

Patrons' League, Cherrydale Public School, Cherrydale, Va., December 7, 1915.

Board of Trade, Hampton, Va., December 11, 1915.
City Club, Cincinnati, Ohio, January 8, 1916.
Workers' Club, Cincinnati, Ohio, January 9, 1916.
Social Workers' Club, Cincinnati, Ohio, January 10, 1916.
Jefferson Medical College, Philadelphia, Pa., January 10, 1916.
Employers' Meeting, Neenah, Wis., January 13, 1916.
Workers' Conference, Tuskegee, Ala., January 26, 1916.
George Peabody College for Teachers, Nashville, Tenn., February 1–28, 1916.
State Medical College, Indianapolis, Ind., February 2–4, 1916.
Chamber of Commerce, Indianapolis, Ind., February 3, 1916.
Public High School, Indianapolis, Ind., February 4, 1916.
College Club of Jersey City, N. J., February 10, 1916.
Bowman, S. C., public meeting, February 19, 1916.
Department of Superintendence, National Educational Association, Detroit, Mich., February 21–25, 1916.
Emporia, Va., February 24, 1916, public meeting.
Lafayette Residence Park, Va., public meeting, March 1, 1916.
South Norfolk, Va., public meeting, March 6, 1916.
Port Norfolk, Va., public meeting, March 8, 1916.
Massachusetts Institute of Technology, Boston, Mass., March 15, 1916.
"The New Club," Boston, Mass., March 16, 1916.
Memphis Commercial Club, Memphis, Tenn., March 31, 1916.
Commercial Club, Omaha, Nebr., April 13, 1916.
University of Missouri, Columbia, Mo., April 18, 1916.
Academy of Sciences, Washington, D. C., April 28, 1916.
Teachers' Institute, Frogmore, St. Helena Island, S. C., April 29, 1916.
Virginia Medical College, Richmond, Va., May 3, 1916.
University of Virginia, Medical College, Charlottesville, Va., May 4, 1916.
School for Health Officers, University of Texas, Galveston, Tex., May 12 and 13, 1916.
Health Day Exercises, Summerville, Ga., May 19, 1916.
Baby Week, Lynchburg, Va., May 24, 1916.
Medical School, University of Wisconsin, Madison, Wis., May 31, 1916.
Teachers' Institute, Texarkana, Ark., June 6 and 7, 1916.
Social Service League, Montgomery County, Takoma Park, Md., June 9, 1916.
Better Community Conference, University of Illinois, Urbana, Ill., June 20–22, 1916.

A series of first-aid lectures were also given at the Seamen's Institute, New York City, during the past fiscal year. From November 22, 1915, until the end of May, 25 courses were given, consisting of 118 lectures. The average attendance was 26.6 per session. At the end of the year examinations were held, and 104 passed and secured the Red Cross first-aid certificates.

DISSEMINATION OF INFORMATION.

In order that the results of investigations shall accomplish their purpose it is necessary to disseminate them through proper channels. Among the means taken to this end are (1) personal interviews with health authorities following particular studies within their jurisdictions, (2) publications, (3) lectures, (4) press service, (5) correspondence, (6) exhibits.

Interviews and conferences.—Inasmuch as many investigations are undertaken on the request of State and local authorities to meet an emergency, the results of investigations are frequently made known verbally as soon as obtained and advice given based on these data, so that remedial action may be immediately taken. Advantage is frequently taken also of situations to advise not only the health authorities but the mayors and councils of cities and, at times, the executives and legislative bodies of States.

Publications.—Monographs on sanitary subjects are regularly issued in the weekly Public Health Reports and in special publications, such as Public Health bulletins and Hygienic Laboratory bulletins. (See report on publications, p. 356.)

Lectures.—Since it is necessary for the service and its officers to keep in touch with the scientific work of others, and to make known results of work accomplished, an essential function, as previously stated, is the attendance at meetings of scientific and sanitary associations. Those in attendance at these meetings represent many sections of the country. There is accordingly presented opportunity to disseminate information first-hand, which will in turn be utilized by others and made available through them to the public at large. Attendance at these meetings is decided upon, therefore, after taking into account the National or State character of the meeting and the objects it has to accomplish. Opportunity is also taken of the presence of officers in the field to give popular addresses. By this means not only is information of local interest conveyed but the activities of the Public Health Service are brought directly to the attention of the public generally. Reference has been made in previous pages to the giving of public addresses in connection with field studies, and on page 104 appears a list of associations which were also thus popularly addressed.

Press service.—Brief abstracts of all publications issued have been furnished regularly to the Division of Domestic Quarantine for dissemination to the newspapers of the country. Some of the results of investigations have also been made public by that division by means of exhibits and stereopticon slides.

MARITIME QUARANTINE.

During the fiscal year ended June 30, 1916, the service operations included, as in former years, the enforcement of the United States quarantine laws and regulations providing measures to be undertaken for the prevention of the introduction of the various quarantinable diseases. In addition to these duties officers of the service were charged with the administration of quarantine stations, including the supervision of the repair and preservation of stationary construction and floating equipment.

At the mainland stations there were inspected 12,120 vessels, and 1,477,055 passengers and crews. At foreign and insular ports service representatives inspected 5,198 vessels and supervised the fumigation of 1,736 vessels. For the destruction of rats and mosquitoes at mainland stations 116 vessels were fumigated with cyanide gas, and 1,678 vessels with sulphur dioxide. The grand total of passengers and crews inspected was 2,037,151 and of vessels fumigated 3,530.

During the fiscal year ended June 30, 1915, the number of vessels inspected at all stations totaled 15,381, and there were 3,498 vessels fumigated. During the fiscal year ended June 30, 1916, service officers inspected at all stations 17,318 vessels and fumigated 3,530 vessels, showing an increase in transactions over the previous fiscal year of 1,937 vessels inspected and 32 vessels fumigated.

EXPANSION OF QUARANTINE ADMINISTRATION.

Service function was augmented by the opening of the quarantine station at Galveston, Tex., on July 19, 1915, and Congress appropriated funds for the purchase of the Boston quarantine station on Gallops Island. During the previous year this station had been leased by the service and was administered by a service officer. At the present time the service controls and administers all quarantine stations of importance on the mainland of the United States, except Baltimore and New York. The latter is in charge of a service officer appointed for such purpose by the governor of New York. Preliminary steps have been taken by the authorities of that State with a view of transferring the quarantine function at the port of New York to Federal control. The city of Baltimore has signified its desire to transfer the quarantine station at that port from the city to the Federal Government.

This has been due to the increasing realization that measures for the exclusion of epidemic maladies properly belongs to the National Government. Since the benefits derived therefrom are not merely local in effect, but are enjoyed by the entire country, upon the whole people thereof should fall the maintenance of such quarantine stations. Arguments for national control of maritime quarantine are numerous, but in addition to the above the chief ones are: Enforcement of regulations and preventive measures in a uniform manner, economical administration, availability of a large ad mobile corps of trained quarantine officers, whose experience in quarantinable diseases and knowledge thereof has been increased by duty in foreign countries and insular possessions where such diseases mainly prevail, increased facilities for cooperation by other branches of the Federal Government, such as the Immigration and Customs Services, availability to the Public Health Service of sanitary reports from consular representatives in foreign countries; ability of the Government to better observe the obligations of international treaties and to demand reciprocal action on the part of the foreign signatories of such treaties.

The National Government now owns and operates 56 quarantine stations on the mainland of the United States, and in the Philippine Islands, Hawaiian Islands, and Porto Rico 26 stations are administered by medical officers of the United States Public Health Service. In addition there are stationed at various foreign ports 17 medical officers of the Service for the purpose of further supervising the enforcement of measures provided by the United States quarantine laws and regulations, applicable to vessels at port of departure when bound for ports in the United States, its possessions or dependencies.

GENERAL PREVALENCE OF QUARANTINABLE DISEASE.

Several unusual conditions operated as an added menace to the sanitary condition of this country, and increased the duties and responsibilities of the officers on duty at the quarantine stations. An alarming increase of typhus occurred in Northern Mexico and Mexican cities located at the border of the United States. Yellow fever was also reported in Mexico, as well as a widespread infection of a malignant form of smallpox. From the various reports obtainable it would seem that on account of the disturbed conditions in that southern Republic practically all measures of sanitation have been suspended, and health conditions are in a more deplorable state of affairs than at any time in the history of modern sanitation.

Yellow fever was reported present in Porto Rico by the post surgeon of the United States Army at San Juan. Neither the officer of the Public Health Service stationed there as chief quarantine officer nor the local sanitary officials agreed to this diagnosis, and later on the disease, which prevailed in epidemic form, was declared to be dengue.

A very considerable epidemic of smallpox occurred in Porto Rico. Preventive measures were applied at San Juan by the chief quarantine officer, and the infection did not extend to the United States.

CHOLERA.

Quarantinable disease prevailed in epidemic form in many foreign ports having extensive communication with this country. Cholera was prevalent throughout India, the countries along the China coast, Japan, Singapore, and in the Malay archipelago, including the Philippine Islands. A very severe epidemic prevailed in

Germany and in Austria-Hungary, and the disease was present to a less extent in the various Balkan States, in Russia, Italy, and Greece. One vessel reporting a suspicious death on voyage arrived at Savannah, Ga., quarantine station from an infected port of North Africa. Bacteriological examination of ship's personnel was made without discovering any trace of cholera infection, and the vessel was permitted to enter without further detention.

Bacteriological examinations were performed on Filipino passengers from Manila destined to Hawaii. As a result 12 carriers of the cholera vibrio were found and refused passage.

PLAGUE.

Plague as occurring in numerous ports having commercial relations with the United States was reported in a very wide area. The disease prevailed practically throughout all of Peru, in the ports of Chile, in Ecuador (more especially Guayaquil), Buenos Aires, and the seaports of Brazil, in Cuba, in the Azores, in Japan, South Africa, Greece, India, Indo-China, Hongkong, and Shanghai, Japan, and the Malay Archipelago, the Philippine Islands excluded. Its widespread prevalence necessitated strict supervision of incoming vessels and incoming cargo from such places, including the fumigation of ships for the destruction of rodents.

In July, 1915, there was reported a case of human plague in Habana. This was the last case of the third epidemic of human plague which occurred in Habana during the years 1912, 1914, and 1915. Owing to the irregular results of bacteriological examinations of rodents in Cuba, it is questionable as to whether the infection has been eliminated at the present time. Notwithstanding the elapse of 11 months from the last indication of the infection, it is borne in mind that an interval of 18 months extended between plague cases in 1912 and the subsequent reappearance of the infection in 1914, during which time it was generally accepted that the infection remained latent in Habana without any manifestation of its presence.

As the result of the fumigation of a vessel arriving at New Orleans quarantine station from India, via ports of England and France, plague infection was found among the rats destroyed. It is believed that this incident would be of more frequent occurrence were it practicable to obtain all the rats destroyed by fumigation. This, however, is impossible on many ships because of their being loaded with cargo, which precludes any thorough search for dead rodents, or because the vessel departs from quarantine before the fumes sufficiently clear from the compartments to permit of search. The above-mentioned ship had a clean bill of health and presented no evidence of being infected; and yet had it not been fumigated, introduction of plague infection into an American port would probably have resulted.

The problem of preventing the introduction of plague seems to have reduced itself to a large extent to the systematic, periodic fumigation of all vessels for the purpose of making them as nearly rodent-free as possible—this with the supervision and treatment, if necessary, of cargo from known plague-infected localities.

YELLOW FEVER.

Yellow fever was reported from Mexico, Guayaquil, and Brazil. Several cases originating in Colombia were held at the quarantine station on the Panama Canal Zone. The service officer detailed for the inspection of the Mexican ports on the Gulf reported fatal cases in several localities, strikingly like yellow fever as to symptoms, although diagnosed by the local sanitary officials as "icteria," "malaria," or "gastroenteritis." Yellow fever, as such, was reported from one Mexican port in May, 1916, and later on developed in other ports of that country. The utmost precautions were therefore observed to prevent the introduction of yellow fever into the ports of the United States. Means were found, however, to facilitate shipping from some of those ports by the requirement of loading at sea and nonintercourse between vessel and shore. The large increase in the number of refugees from Mexico to the United States which occurred in the spring of 1916 very greatly taxed the facilities of the quarantine stations at the Southern ports of the United States.

Acting Asst. Surg. Stewart reports that yellow fever is probably endemic in Venezuela, but that owing to its continued presence in that country the nonimmune number of persons is so small that an epidemic of yellow fever seems improbable from the lack of infectible material. It is not improbable that in certain sections of Mexico and South America the same condition exists, the occurrence of any noticeable number of yellow-fever cases being dependent upon the introduction of persons susceptible to the disease.

TYPHUS FEVER.

Typhus infection, while chiefly menacing the United States from the border country of Mexico, was also considered a source of danger from its prevalence in various south European localities, as a very severe epidemic ravaged the Balkan States, and the disease occurred to a less degree in Russia, Italy, Spain, and practically all European nations.

SMALLPOX.

Smallpox is practically pandemic, its occurrence in greater or less degree being reported from all countries.

TYPHUS FEVER ON THE MEXICAN BORDER.

A very fatal type of typhus fever has been known to exist in Mexico for many years, but as heretofore the infection was confined to the higher altitude of the central section and chiefly prevailed during the colder months, its extension to the border and coast cities was assumed to be improbable because of unfavorable climatic or other natural conditions. Following the disordered conditions in that southern Republic, however, and largely attended by neglected sanitation and abnormal and unusual troop and refugee movements, typhus fever overflowed its former boundaries and cases commenced to be observed in the border and coast cities of Mexico. Aside from the increased travel from the interior toward the border of Mexico, the neglect of personal hygiene and lowered body resistance that accompanies destitution may also have been a factor in the increased prevalence of the disease amongst the lower-class Mexicans.

The presence of typhus in American territory along the border first became known on December 14, 1915, when three cases were reported from Laredo, Tex. Senior Surg. C. C. Pierce was immediately ordered to take charge of service operations on the border and remained on that duty until May 15, 1916. Asst. Surg. E. W. Scott was also ordered to duty at Laredo to take charge of service operations at that place, being assisted in his work by Acting Asst. Surg. H. J. Hamilton. During the month of June, 1916, Surg. B. J. Lloyd was ordered to the border and has been continued in charge of service operations in that section.

The problem of applying any effective preventive measures was a difficult one. The overland extension of typhus had not been anticipated, and the quarantine equipment at the border points of entry was inadequate. To this handicap there was added the inability to confine incoming travel to the ports of entry. The Rio Grande is easily forded in places, and clandestine crossing for the purpose of evading the customs and immigration laws of the United States has always been common. The imposition of quarantine restrictions has a tendency to increase this illegal practice. Senior Surg. Pierce, however, was able to secure fairly effective means of preventing the introduction of typhus with the cooperation of the local Mexican officials in the border cities, the inspection force of the United States Immigration Service, and the officials of the Texas State Board of Health. The cooperation extended by these Federal services and the State officials of Texas was cordial, and the results obtained were as satisfactory as could be expected considering the multifold obstacles that are inevitably present in any overland quarantine system.

Disinfection plants were found in the Mexican towns of Piedras Niegras, Juarez, and Nuevo Laredo, and at Senior Surg. Pierce's solicitation such equipment was repaierd, bathing facilities added, and vermin-infested persons and personal effects were treated under the supervision and with the assistance of service representatives. At Matamoros a dry-heat disinfector was installed for the treatment of vermin-infested articles, and the same object was attained at Roma, Rio Grande, and other smaller places by the immersion of such articles in gasoline. Reliance was placed on the application of gasoline or a mixture of coal oil and vinegar for the destruction of body lice on incoming travelers.

The ideal system of prevention would have involved the treatment of persons and their effects for the destruction of vermin, and the detention of travelers to complete the period of incubation of typhus—i. e., 12 days—but the latter procedure was rendered impracticable because of the enormous financial expense and the increased incentive to travelers for evading any and all restrictions by resorting to clandestine crossing. The facilities for illegal entry that existed along the Texas-Mexico border are greatly increased along the border of Arizona and New Mexico, where not even a river interposes an obstacle to the crossing of the boundary line. The maintenance of detention camps would probably have intailed the daily care and subsistence of some 50,000 persons, and the measure was dismissed as impracticable.

Another feature that has increased the difficulty of enforcing an efficient quarantine is the large amount of local traffic. Juarez, Mexico, and El Paso, Tex., are practically one city, the Rio Grande River dividing the two, and the same description applies to Laredo, Tex., and Nuevo Laredo, Mexico, as also to Brownsville, Tex., and Matamoros, Mexico, and various other border cities. A great many persons live on one side of the boundary and have their occupation in the opposite town, this necessitating one or more daily trips. Considering all things, the situation was a difficult one.

At one period refugee Mexicans poured into the American cities in such vast numbers as to cause grave anxiety amongst the local authorities, and request was made of the bureau to have invoked the authority of the act of 1893, prohibiting all incoming travel. Fortunately, however, it was found possible to avoid such extreme action. Admission was refused to all sick persons. Reliance, however, was placed on the requirement that all incoming travelers should be free from vermin, both as to person and effects. With this condition accomplished the potential transmission and extension of the infection was prevented, even though the traveler might be in the incubative stage and later on develop symptoms; the nontransmission, of course, being dependent on the person's continued noninfestation by lice. It is possible, of course, that there may be means for the extension of typhus infection other than by insects, but this means of conveyance has been the only one considered. In view of the many thousands of travelers that have entered the United States from Mexico, it speaks well for the method employed that thus far there have been only 104 cases in the State of Texas, 11 cases in Arizona, and 8 cases in New Mexico. These figures are not accurate but are approximately correct. Of these totals a very considerable number of cases acquired their infection in louse-infested Mexican colonies located in the various American communities on the border. At the end of the fiscal year the case incidence of the disease had diminished to a negligible number, but apprehension is felt as to a possible recrudescence during the coming winter. Plans have been made and partially carried into effect, for the installation of adequately equipped quarantine stations on American soil, containing provision for steam sterilization of personal effects, cyanide-gas chambers, bathing facilities, and accommodations for delousing infested persons. Surg. Lloyd has supervision of all service quarantine procedures along the border, and is especially engaged in organizing quarantine facilities of a more permanent type than have previously existed.

Senior Surg. Pierce reports, in detail, as follows:

> For the past year typhus fever prevailed extensively throughout Mexico, especially in the States of Guanajuata, Jalisco, Queretaro, Michoacan, San Luis Potosi, Aguascalientes, Puebla, the Federal District, Zacatecas, and southern Coahuila. Upon my arrival at Laredo, shortly after the reporting of cases in that city on December 14, arrangements were made with the Mexican officials at Nuevo Laredo, Mexico, opposite Laredo, Tex., whereby an abandoned French steam chamber of large size was repaired and put into commission for sterilizing clothing and personal effects of passengers arriving from Mexico. Shower baths were installed at the disinfection station thus established, and male and female service attendants were nominated for duty in connection with the operation of the plant. Since the equipment of the disinfection station, all passengers from Mexico, corresponding to the steerage class on vessels, are required, upon arrival at the border, to go to the plant from the railroad station. There they remove their clothing and take a bath; while bathing, their clothing,

other wearing apparel, and bedding is disinfected with steam under pressure to destroy vermin. Those that are infested with head lice have their hair clipped short, and all are required to wash their heads in gasoline, or a mixture of vinegar and kerosene oil. After a thorough cleansing of the person, the sterilized clothing is returned and the passengers leave for American territory, with a certificate signed by the service attendant, who is on duty at all times while the disinfecting plant is in operation.

Similar arrangements were soon made at Piedras Negras, opposite Eagle Pass, Tex., and during March, 1916, at Juarez, opposite El Paso. At Matamoros, opposite Brownsville, Tex., no steam chamber was available. At this place a hot-air oven of large size was designed by the officer in charge of the border quarantine and the officer at Brownsville for disinfecting clothing. In this oven a temperature of 300° F. can be secured in 20 minutes. This apparatus is cheap and gives satisfactory results, but would not be applicable for stations where a large amount of disinfection is necessary. This is because there is no pressure inside the apparatus, therefore no power of penetration, so that clothing must be laid out on racks and not thrown in, tied in bundles.

A similar hot-air apparatus was made and installed at Hidalgo, Tex. New ports of entry were also established at Rio Grande City and Roma, Tex., as it was reported that persons were crossing at these two places, presumably to avoid quarantine and immigration inspection. Acting assistant surgeons were assigned to duty at these stations, where disinfection of clothing is accomplished by boiling or by submerging in gasoline, as but few passengers require treatment at these ports.

The ports of entry of Arizona were inspected and recommendations made to closely inspect all immigrants for body lice and to remand those infested until they had freed themselves of vermin. No disinfection arrangements were made at the Arizona ports nor at Del Rio, Tex., as the immigrants arriving at those places do not come from badly infected areas on account of the railroad facilities into Mexico from those places.

Some of the cases reported at El Paso developed among recent arrivals before the establishment of the disinfection plant at Juarez. The infection there was controlled by the joint action of two service officers and the State, county, and city health officials, with the cooperation of the county supervisors, the mayor, and council of El Paso. In suppressing typhus in El Paso a systematic campaign was carried on by the officials mentioned to free all persons from body vermin. A house-to-house canvass was made among the Mexican laborers and their families by male and female employees of the city and county. All persons were made to undress, wash their heads in vinegar and kerosine, bathe, and to immediately boil their clothing, all such measures being accomplished under supervision. This was repeated once each week for several successive weeks.

The chief difficulty encountered in enforcing quarantine against arrivals from Mexico is due to the fact that illegal entry can easily be made into the States from Mexico all along the Mexican border. The Rio Grande is shallow most of the year, and numerous fords exist where persons may cross. Many small boats operate as ferries, often in an illegal manner.

The economic and political conditions in Mexico at present are such as to cause large numbers of Mexicans seeking a livelihood to make every effort to enter the United States. Many of these persons are without funds upon arrival at the border and are therefore frequently refused entry by the Immigration Service. Naturally those so refused attempt to enter clandestinely. To prevent this, so far as possible, representations were made to the Immigration Bureau, as a result of which a large force of additional guards was temporarily engaged to suppress illegal entries. Considerable assistance was also secured from the military authorities along certain sections of the border and from local and State officials in Texas. To completely patrol the Mexican border would require thousands of guards and is impracticable on account of the enormous expense that would be involved.

The officer in charge of border quarantine from January until late in May, 1916, conferred with the local authorities in many of the border towns, both in Mexico and the States, with a view of getting the local prison, cheap lodging houses, charitable institutions, and the hovels of the poor in better sanitary condition and their occupants freed from body vermin. Various railroad companies were requested to cooperate by requiring vermin destruction in the section camps and in the box cars used as barracks for laborers, and to compel those living in these places to boil their blankets, sheets, etc., and underclothing as soon as removed. It is believed that considerable improvement in conditions resulted from this work.

Many talks were made at various meetings of physicians and other gatherings regarding the spread of typhus by body lice, the diagnosis of typhus fever, and methods for lice elimination. Circular letters were distributed to those interested and valuable sanitary work resulted therefrom. Several mining companies were advised as to the necessary sanitary work and carried into effect the measures recommended for typhus prevention.

The following cases of typhus were reported from December 1, 1915, to June 30, 1916:

El Paso, Tex	55	Milam County, Tex	4
Conejo, Tex	4	Hayes County, Tex	3
San Antonio, Tex	2	Jeff Davis County, Tex	2
Eagle Pass, Tex	1	Falls County, Tex	1
Laredo, Tex	17	Hurley, N. Mex	3
Moore, Tex	6	Santa Rita, N. Mex	3
Aragon, Tex	1	Malpais, N. Mex	2
Bracketville, Tex	6	Miami, Ariz	1
Pearsall, Tex	1	Morenci, Ariz	10
Anderson County, Tex	1	Ventura County, Cal	1

TRANSACTIONS RELATIVE TO MEXICAN PORTS.

For the purpose of securing reliable information of the sanitary conditions of the ports of Mexico on the Gulf, in order that adequate quarantine safeguards could be imposed against vessels bound from those places to American ports without needlessly restricting commerce, a service officer well versed in yellow-fever diagnosis and with a general knowledge of sanitation was selected for the purpose of making an inspection of the various Mexican ports. For this work Surg. G. M. Corput was detailed, as in the previous year. Leaving New Orleans early in April, he visited in turn Progreso, Merida, Vera Cruz, and Tampico. Surg. Corput reported that the sanitary condition of these places had greatly deteriorated since his visit of the year before.

Progreso was inspected on April 27. Smallpox was found to be quite prevalent, with little or nothing being done to restrict its spread, only the severe cases being taken to the lazaretto, and the mild ones being permitted to have unrestricted movement. As a result of the discontinuance of antimosquito work, aedes calopus were found to be very abundant and very active.

In Merida, the capital of the State of Yucatan, located a few miles inland from Progreso, practically the same conditions were found as at the latter place, except that aedes calopus were more abundant. None of the buildings were screened, and no work was being done to prevent mosquito propagation. A visit was made to the chief sanitary officer of the State, who was found to be uncommunicative, and who denied the presence of yellow fever, although admitting that a considerable number of mild cases might be present without his knowledge, especially in children, as the physicians there based their diagnosis of yellow fever largely on the occurrence of black vomit, cases of yellow fever in which this did not occur being diagnosed either as "paludisma" or "perniciosa." The failure to carry out antimosquito work was represented as being due to inability to secure oil.

Vera Cruz was visited on the morning of April 29. The sanitary condition of the city was found to be extremely defective. The rainy season had begun and mosquitoes were abundant, the following varieties being identified: *Ædes calopus*, *Anopheles quadrimaculatus*, *Culex fatigans*, and *Culex solicitans*. Smallpox was present. Typhus fever was also present, but the exact number of cases was not ascertainable, as little or no record was kept, and the authorities were apparently unwilling to furnish any information of value. The presence of yellow fever was denied. That dengue (?) had been present late in the fall of 1915 was admitted. From the meager information obtainable, Surg. Corput considered that at least part of these cases of so-called dengue were probably yellow fever. Three days were spent by the inspector investigating conditions in Vera Cruz. The data relative to sanitary conditions which were furnished the United States consulate by the local authorities were always several weeks behind the current occurrence of disease and were very incomplete.

Investigation was made as to the possibility of establishing a mosquito-free place in Vera Cruz, where passengers might be held under observation for a few days prior to their departure for the United States, but such measure was found to be impracticable.

The inspector arrived at Tampico May 1, where conditions were found to be much the same as at the other ports visited. Smallpox was present and under little restriction, two well-defined cases being seen among the beggars who congregate in large numbers in the public places and on docks, awaiting the arrival of ships. Typhus fever was present, but information as to the number of cases was not obtainable, although five deaths had been reported as due to typhus during the week previous to visit. About 30 cases diagnosed as dengue had occurred in November and December, 1915. Some physicians had suspected that it was yellow fever, as in all cases where urine analysis had been made, albumen was present in marked quantities. An American girl about 19 years of age had been taken ill with the disease on December 17, dying on the 20th after complete anuria for 24 hours. After her death diagnosis was changed from dengue to "perniciosa." From the history obtained of the case the inspector felt sure that the woman had died of yellow fever.

In summing up his report Surg. Corput expresses the belief that no sanitary or quarantine measures of any value were being enforced by the local authorities at the ports visited; that the shipping agents, even if willing, were unable to carry out any measures which would justify a modification of the quarantine regulations.

The unfavorable forecast made by the inspector was confirmed later on in the year by the occurrence of yellow fever at Frontera, Merida, and Progreso. Cases of yellow fever were reported at Progreso and Merida by Acting Asst. Surg. Gimler. The disease was never officially reported by the Mexican authorities, but two cases of yellow fever were discovered and detained at the New Orleans quarantine station.

In accordance with Surg. Corput's recommendations, the following circular was issued:

WASHINGTON, *May 25, 1916.*

MEDICAL OFFICERS IN CHARGE,
United States Quarantine Stations.

SIR: For your guidance the following provisions will apply to vessels from Mexico arriving at a port of the United States south of the southern boundary of Maryland during the close quarantine season:

1. Vessels from Progreso, Tuxpam, or Frontera that have discharged or loaded cargo at sea and have not been alongside a wharf, have had no crew

ashore, and carry no passengers, may be passed without fumigation or detention of crew or vessel, provided all are well upon arrival and the above provisions have been certified to by an accredited medical officer of the United States.

2. Vessels from all other Mexican ports, and those from Progreso, Tuxpam, or Frontera that have not complied with the foregoing requirements, shall be treated according to the provisions of paragraph 105, Service Regulations.

Vessels from Colombia, Venezuela, or any other port of South America or the West Indies suspected of being infected with yellow fever, shall be treated according to paragraph 105, Service Regulations.

Respectfully,

RUPERT BLUE, *Surgeon General.*

As in former years, medical officers of the service were assigned to duty at the American consulate at Progreso, Vera Cruz, Tampico, Tuxpam, and Puerto Mexico. The tour of duty of these officers extends throughout the close quarantine season, from April 1 to November 1. They enforce the provisions of the United States quarantine regulations as applying to ships at port of departure when sailing for an American port. Their work consists in fumigating ships for the destruction of mosquitoes or rats, supervising measures to prevent the ingress of rats or mosquitoes at the foreign port, and in certifying as to the nonintercourse of ships' personnel with shore when vessels lie well out beyond the range of mosquitoes, and very materially facilitates maritime traffic between the Mexican ports on the Gulf and United States ports. The detailed report of the operations of these officers appears elsewhere.

DESTRUCTION OF RATS ON VESSELS.

Vessels arriving from foreign ports infected with plague or suspected of plague infection were treated at the quarantine stations for the purpose of destroying rats. While as in former years sulphur dioxide, carbon monoxide, and cyanide gas were severally used as a destructive agency, of the three fumigants mentioned, cyanide gas has been growing in favor on account of its many points of superiority, and the use of carbon monoxide has been practically suspended, the use of sulphur dioxide being materially lessened.

For a number of years cyanide gas has been used for the destruction of insect and parasite life, more especially in horticulture, but it has had limited application in the fumigation of confined spaces, on account of its great toxicity and the great danger to human life incident to its manipulation.

Authorized as a fumigant in the United States quarantine regulations of 1910, it was used on a large scale by service officers in quarantine work in Porto Rico in 1912 and 1913, by the Cuban authorities in Habana in 1914, and by service officers in New Orleans from 1914 to the present time, with great success.

By experiment both under natural conditions and under artificial conditions that simulated the natural, it has been determined that a smaller proportion of the gas is sufficient for rat and insect extermination than was formerly considered necessary, the reduction being from 10 ounces to 5 ounces of cyanide per 1,000 cubic feet of space.

With this reduced percentage of gas, and by the observance of ordinary precaution, the danger to human life has been proven to be avoidable.

In general, it may be said that workers in cyanide gas fumigation, when initiating the process, are prone to be extremely cautious, but as they become more proficient, and fumigation proceeds without any mishap, carelessness takes the place of caution, and sooner or later a fumigator is apt to be temporarily overcome. Such instances as have occurred along these lines in the service work have been due to disregard by the fumigators of the most explicit instructions. In New Orleans there were fumigated by cyanide gas during the past year 426 vessels with no fatalities. In the two instances where fumigators were temporarily overcome, the men, for the purpose of rushing their task, thereby the earlier to finish their day's work, opened the doors of compartments upon completion of time of exposure and, in direct violation of written orders, immediately entered.

It is the rule at New Orleans to wait 15 minutes after opening doors of superstructures of ships and 1 hour after opening holds before anyone shall enter; this as a minimum, to be prolonged if necessary.

During the past natural ventilation has been depended upon for the dissipation of cyanide fumes, but it is contemplated during the coming year to remove the last vestige of danger attending the employment of this method of fumigation by utilizing some form of blower, operated by a small gasoline engine or motor for the purpose of dispelling the gas from compartments before permitting anyone to enter. It is anticipated that the blower, with motive power, will be of a light, portable design.

An added safeguard by using captive animals for purpose of detecting the presence of cyanide gas is being planned.

With this additional safeguard, and performed under the supervision of responsible persons, it is believed the fumigation of vessels by cyanide gas will grow in magnitude of application.

Contrasting the merits of the three most frequently used fumigants—sulphur dioxide, carbon monoxide, and hydrocyanic acid gas, it is apparent that the use of cyanide gas has many points in its favor as a fumigant over the employment of sulphur dioxide and carbon monoxide, when the fumigation contemplates the destruction of rats, either in buildings on land or on vessels. Sulphur dioxide, while fairly effective, is not very penetrating. It diffuses very poorly, and in actual practice it would seem that air pockets in articles of cargo or between packages would afford to rats a sufficient protection against the effect of the sulphur fumes. Its use is highly destructive to various articles, and its generation requires cumbersome apparatus and the expenditure of considerable time. Being less toxic than hydrocyanic acid gas or carbon monoxide, sulphur dioxide requires a much longer exposure. The exposure to sulphur fumes requires from 6 to 12 hours, in contrast to approximately 1 hour when cyanide gas is used. The lack of diffusive qualities limits the use of sulphur dioxide almost exclusively to the fumigation of vessels in ballast, and even in the latter rodents have been known to escape destruction by seeking the protection of air pockets made available by the construction of the ship.

Carbon monoxide, while highly efficient, requires such complicated apparatus for its generation that the use of this gas as a fumigant is restricted to quarantine stations or other localities where proper care and attention can be given to the apparatus required, which necessitates the employment of expensive floating equipment and a considerable force of employees. Moreover, this gas is valueless for the destruction of the lower forms of animal life, such as fleas, flies, and mosquitoes.

To the disadvantage of sulphur fumigation must be added the danger of fire, a necessary attendant to the generation of this gas by the "pot" method.

Hydrocyanic-acid gas is the most penetrating and the most toxic of these fumigants. It is easily and quickly generated, requires very little apparatus, is not destructive to inanimate objects, and in the hands of experienced operators its use is not attended by more danger to persons than is the use of carbon monoxid.

As a result of various experiments and observations under natural conditions the following provisional standard has been adopted as to the strength of cyanide gas necessary for the destruction of various insect and animal life:

For mosquito destruction, 0.4 ounce cyanide salt (preferably the sodium salt) per 1,000 cubic feet of space, exposure for 15 minutes.

For bedbug destruction, 5 ounces cyanide salt (preferably the sodium salt) per 1,000 cubic feet space, exposure for 1 hour.

For destruction of body lice, 10 ounces of cyanide salt (preferably the sodium salt) per 1,000 cubic feet of space, exposure for 2 hours.

For destruction of roaches, 10 ounces of cyanide salt (preferably the sodium salt) per 1,000 cubic feet of space, exposure for 1 hour.

For rats and fleas, 5 ounces of cyanide salt (preferably the sodium salt) per 1,000 cubic feet of space, exposure 1 hour.

The comparative cost of sulphur and cyanide fumigation per 1,000 cubic feet based on the provisional standard advocated would be:

Fumigation for—	Cost of cyanide gas per 1,000 cubic feet.	Cost of sulphur dioxide per 1,000 cubic feet.
Destruction of—	*Cents.*	*Cents.*
Mosquitoes	0.7	5
Body lice	18	10
Bedbugs	9	5
Roaches	18	10
Rats and fleas	9	10

Cyanide is much cheaper than sulphur dioxide for mosquito destruction, costing only one-seventh as much as the latter gas, aside from requiring a much shorter duration of exposure. Formerly the cost of rodent destruction by cyanide gas was about equal to that of sulphur fumigation, but more recently the cost of the chemicals entering into cyanide fumigation has increased in some parts of the country, so that in the latter places cyanide fumigation costs about 10 per cent or 20 per cent more than sulphur fumigation; but on account of the lessened period of exposure and numerous other points of advantage cyanide gas is a preferable fumigant.

No accurate comparison can be made between the cost of cyanide fumigation and carbon monoxide fumigation since the latter varies, depending upon the number of vessels fumigated, a large and fixed overhead charge always being present. During the month of June, 1915, there were fumigated by carbon monoxide at New Orleans 58 vessels in addition to those treated with sulphur or cyanide gas. This period was selected at random and represents the usual monthly average of ships fumigated at that place. The total expense, including the pay and subsistence of the crew of the fumigating tug and the cost of the coke consumed, was $1,801.48. This, however, did not take into consideration the depreciation of the vessel and machinery. On this basis the unit cost per thousand cubic feet of space fumigated by carbon monoxide was slightly over 16 cents, in comparison with the unit cost of 11 cents for sulphur fumigation and 9 cents for cyanide fumigation.

In every way cyanide gas is superior as a fumigant to all other agents used thus far, and the sole obstacle to its greater employment is the danger to human life. With improved facilities for the generation of the gas and a mechanical contrivance for quickly dispelling the fumes in confined spaces after the termination of the exposure it is believed that the only objection now standing in the way of the widespread employment of cyanide gas will be removed. As an additional precaution in the employment of this fumigant there are quoted the following instructions issued by the Surgeon General to officers of the Public Health Service to be followed in the fumigation of vessels by cyanide gas. These instructions provide for measures that will insure efficiency of fumigation as well as affording certain safeguards to human life:

> When performing the cyanide fumigation of compartments you will be guided by the following minimum requirements:
>
> 1. On account of the great danger to human life from hydrocyanic-acid gas specific arrangements should be made for the disposition of the crew during the fumigation process, especially if one or two compartments of a vessel are to be treated. A written statement must be obtained from the captain or first officer of the vessel that the latter is ready for fumigation and that every member of the crew has been accounted for as not being in the vessel, or else not exposed to the fumes of the gas. Persons in one compartment have been killed by fumes escaping from another compartment undergoing fumigation.
> 2. Not less than 5 ounces of potassium cyanide, or 3¾ ounces of sodium cyanide, shall be used to each 1,000 cubic feet of space, inclusive of that occupied by cargo.
> 3. To each ounce of potassium cyanide 1 fluid ounce of commercial sulphuric acid 66 B and 2½ fluid ounces of water shall be used.
> 4. To each ounce of sodium cyanide 1½ fluid ounces of sulphuric acid 66 B and 2 fluid ounces of water shall be used.
> 5. All ingredients shall be weighed and mixed immediately prior to each fumigation.
> 6. All parts of the vessel shall be placed under fumigation simultaneously, except such compartments as may not require fumigation in the opinion of a representative of the United States Public Health Service. (Review par. 1.)
> 7. All compartments placed under fumigation shall be kept closed for not less than one hour.
> 8. The hatches of 'tween decks and the doors of subcompartments are to be opened prior to fumigation, and the barrel or other generator is to be placed so as to secure the most rapid and efficient diffusion of the gas.
> 9. All work is to be done under the supervision and to the satisfaction of the medical officer in charge, United States Public Health Service, or his representative.

The various details of fumigation by cyanide gas, with accounts of practical experiments relative thereto, the comparison of the merits and costs between cyanide gas and other fumigants are all set forth in Reprints Nos. 239, 313, and 343 from the Public Health Reports.

The known number of rats destroyed by fumigation of vessels during the year was 12,728. This probably represents but a small part of the total, as a search for killed rats is often precluded by reason of the fumigated vessel being cargo laden, or because the vessel often leaves the station before the fumes have sufficiently cleared from the holds as to permit of search.

The periodical fumigation of vessels operates not only as a sanitary safeguard, but results in material saving to commerce, through the extermination of the destructive rodents. This was well illustrated in the case of a vessel that arrived at New Orleans from a South American port. By combined trapping and fumigation somewhat over 200 rats were killed at New Orleans, but during the course of the voyage from South America the depredations of these rodents resulted in the damage of 30,000 sacks of coffee of a total of 40,000.

The cost of labor in resacking and the damage to the sacks exceeded $2,000. This did not include the loss of more or less coffee and the adjustment of claims made by consignees. The cost of fumigation at port of departure would have amounted to about $50, and the loss that did occur would have been prevented.

VIOLATION OF QUARANTINE LAWS.

During the fiscal year 1916, 83 cases, involving the incurring of penalty for violations of the act of February 15, 1893, by reason of failure to produce an American consular bill of health from the foreign port of departure upon entry at an American port, were decided by the Secretary of the Treasury. In 49 cases mitigated penalties were imposed and 34 cases were dismissed without penalty on account of extenuating circumstances.

Table giving transactions at national quarantine stations for the fiscal year ended June 30, 1916.

Stations.	Vessels inspected.	Vessels spoken and passed.	Vessels quarantined.	Vessels fumigated.	Passengers and crews inspected.
Alexandria	1				
Beaufort					
Biscayne Bay	105	195		29	3,057
Bocagrande	21	69		4	547
Boston	642			91	19,362
Brownsville					74,054
Brunswick	67	6		34	1,439
Cape Charles	1,851		1	136	76,705
Cape Fear	39			11	1,022
Charleston	113			17	3,175
Columbia River	92			11	2,733
Coos Bay					
Cumberland Sound	41	12		10	741
Darien	15				
Delaware Breakwater	47	5		1	1,257
Delaware River (Philadelphia)	988	5		359	36,131
Eagle Pass					[1] 149,219
Eastport	844				56,728
El Paso					[1] 26,244
Eureka	21				
Everett	1				31
Galveston Quarantine	635		11	116	17,801
Georgetown	2				16
Gulf	123	9		77	1,801
Hoquiam					
Key West	752			44	60,511
Ketchikan	216				11,877
Laredo					[1] 654,342

[1] Border station; overland travel.

Table giving transactions at national quarantine stations, etc.—Continued.

Stations.	Vessels inspected.	Vessels spoken and passed.	Vessels quarantined.	Vessels fumigated.	Passengers and crews inspected.
Mobile	567	....	7	152	10,896
Morgan City	13	....	3	1	94
New Orleans	1,534	177	70	139	71,876
Pascagoula	80	....	....	16	620
Pensacola	241	....	1	59	3,408
Perth Amboy	134	1	....	22	3,010
Port Angeles	18	....	1	....	243
Port Harford	54	....	....	....	2,162
Port Inglis	2	....	....	....	52
Portland, Me	266	12	....	....	8,735
Port Royal	1	....	....	....	8
Port Townsend	276	....	56	....	35,857
Providence	35	....	....	2	5,894
Reedy Island	....	....	....	....	....
San Diego	573	25	....	2	22,207
San Francisco	762	3	....	254	89,204
Santa Barbara (Los Angeles)	4	....	....	....	69
San Pedro (Los Angeles)	187	....	....	7	10,597
Savannah	204	....	2	64	5,264
South Bend	2	....	....	....	9
St. Andrews	57	....	17	....	....
St. George Sound	7	....	....	4	70
St. Johns River	103	....	....	27	3,844
St. Josephs	8	....	....	3	125
Tampa Bay	245	4	....	45	3,588
Tacoma	57	....	....	57	430
Total	12,120	523	169	1,794	1,477,055

REPORTS FROM NATIONAL QUARANTINE STATIONS.

During the fiscal year ended June 30, 1916, a total of 12,120 vessels were inspected at the various stations in the United States. Of this number, 1,794 were fumigated, either for the destruction of mosquitoes as a precaution against the introduction of yellow fever or for the destruction of rats and other vermin as a precaution against plague.

In addition, 523 vessels were spoken and passed, making a grand total of 12,643 vessels and 1,477,055 passengers and crews passing under the observation of the service at ports in continental United States.

Following are the summaries of the operations at the various quarantine stations:

Alexandria, Va.—Acting Asst. Surg. Arthur Snowden in charge. One vessel was inspected and passed. At Alexandria, Va., the quarantine inspection is also made of vessels destined to Washington, D. C.

Atchafalaya, La.—Post office and telegraphic address, Morgan City, La. Acting Asst. Surg. W. T. McClellan in charge.

Transactions.

Total vessels entering port	13
Vessels inspected and passed	9
Vessels inspected and detained	3
Vessels inspected and fumigated	1
Officers and crew inspected	91
Passengers inspected	3

No case of quarantinable disease was found during the year. On vessel fumigated very few rats were found. The majority of vessels arriving at this port are regularly employed in the lumber trade.

Beaufort, S. C.—Post office and telegraphic address, Chisolm, S. C. Acting Asst. Surg. Christopher G. Hay in charge. No transactions.

Biscayne Bay quarantine.—Post office and telegraphic address, Miami, Fla. Acting Asst. Surg. James M. Jackson in charge.

During the year 195 vessels were spoken and passed, 6 steamers and 99 sailing vessels were inspected and passed, and 1 steamer and 28 sailing vessels were disinfected for rats and passed. All vessels were required to rat guard all dock lines and to fend off. These vessels carried 211 passengers and 1,046 crew.

There has been a notable diminution in the number of steamers entering Miami during the past year, owing to the fact that the bar at the mouth of the bay was shoaled so as not to afford sufficient water for the regular winter steamship traffic usually carried on. The old pass has shoaled and the new channel has not reached a sufficient stage of completion yet to be used, but it is hoped this condition will be overcome in a short time.

It is also notable that the number of aliens arriving at this port during the past fiscal year has diminished. This has been due to the European war, which has shut off the supply of dyestuffs, and the gathering of dyewoods in the Bahama Isles has been quite profitable until recently, thus keeping at home a large part of the aliens who used to come here to work.

There has been a very small number of rats found in fumigating vessels. This is believed to be due to the continued fumigation once in three months which has existed for the past two years, as directed by the bureau.

Boca Grande (Fla.) quarantine.—Post office and telegraphic address Boca Grande, Fla. Acting Asst. Surg. G. E. Atwood in charge.

Summary of transactions.

Vessels entering port	90
Spoken and passed	69
Inspected and passed	17
Inspected and fumigated for destruction of rats	4
Officers and crew inspected	547
Total number of rats killed as result of fumigation	108

No quarantinable or reportable disease was encountered during the year.

Boston quarantine, Boston, Mass.—Post-office and telegraph address, Gallops Island, Boston, Mass. Surg. S. B. Grubbs in charge.

The Boston quarantine was operated during the fiscal year ended June 30, 1916, under a lease from the city of Boston at a nominal rental. The station with its equipment and entire personnel was taken charge of on June 1, 1915. During the year several changes in the personnel were made by which expenses were decreased and efficiency increased.

Personnel and equipment: The personnel at the close of the year consists of the medical officer in charge, two acting assistant surgeons, one pharmacist, seven attendants on shore and seven on the quarantine steamer *Vigilant*. The principal buildings are executive building, with office, quarters for acting assistant surgeons and shore forces, dining room and kitchen; two barracks, with standee bunks, together accommodating 600; kitchen and dining room for steerage passengers; bathhouse; two hospitals of four wards each; two storehouses and a barn.

All of these buildings have been put in good repair by the station force, and painting has begun. Changes have been made to increase their usefulness. Drinking fountains have been made, and movable property has been listed and stored in safe and convenient places.

It has been recognized that the quarantine diseases of greatest importance to Boston are plague, typhus fever, and cholera.

Plague: Vessels arrive at Boston from practically all the plague-infected ports of Africa, South America, and Asia, and, owing to high freight rates, they seldom arrive empty. Good fumigation before entry is difficult, and any delay causes great opposition. For this reason the use of hydrocyanic-acid fumigation was begun early in the year. Sulphur has not been abandoned, but is still used in holds when time is of little consequence. Superstructures are now fumigated regularly with hydrocyanic-acid gas, which were previously not treated. This work is done chiefly at the wharf after discharge, as before, but; in addition, fumigation of superstructures and at times of the holds of certain vessels is now done on arrival.

The time a ship must sacrifice is now not over 4 hours, as against 12 to 18 for sulphur. So long as the present precautions are carried out the danger to human life is believed to be small. Results of fumigations are checked by reports on cards, which each captain is requested to return. At the same time experiments with rats are still in progress. The question of rat guards and raising gangways on vessels from suspected ports which have been allowed to discharge before fumigation is unsatisfactory and unsettled. At present the quarantine steamer makes several trips a week to see that these precautions are carried out, and efforts are being made to delegate this work to authorities on shore.

Typhus fever: At present all the immigrants arriving at Boston are from Naples and the Azores Islands, but after the present war a large immigration from typhus-infected countries is expected. Arrangements have been made by which large numbers of persons may be treated to free them from lice. The arrangement is as follows: After separating the sexes, each person undresses in one end of the bathhouse and places his clothes in a numbered canvas bag. The corresponding number on a metal check is put about his neck and all baggage similarly marked. Each person is then sprayed with a gasoline soap mixture and passes through a shower bath, 15 feet long, in which water stands 20 inches deep. The shower is the only passage to the clean side of the bathhouse. The spray used is a stock of soap 1, water 4, gasoline 4, diluted with five parts of hot water. This is sprayed on all parts of the body with a Myer's O. K. spray pump with mechanical agitator, which is installed in a barrel. Gasoline was adopted for this purpose as it was reported as the most efficient agent used against lice by the English Army. The spray drives it into the hair and creases of the body. It lathers freely and causes no injury even in the eyes. The baggage and canvas bags of clothing are placed on the carriage of the steam chamber and closed inside. A vacuum of 15 inches mercury is then created and hydrocyanic acid gas generated at the rate of 3 ounces sodium cyanide per 100 cubic feet is allowed to enter the apparatus. The air valves are opened and all allowed to stand until 30 minutes have elapsed after the gas was generated. By this process, as has been demonstrated, vermin in tightly packed clothes or closed trunks are killed. The process eliminates unpacking, which is necessary if no vacuum is used, as well as the added task of sorting out certain articles if steam disinfection is employed. As no suitable apparatus was available the vacuum at Boston must be obtained from the condenser of the quarantine steamer *Vigilant* and the hydrocyanic acid gas is generated in a small generator made on the station. In addition a room has been built for loose clothing into which hydrocyanic acid gas may be injected from a generator and from which it may be withdrawn by an electric fan without at any time opening the door.

Cholera: This station is now prepared to make examinations for cholera carriers. Two rooms in one of the storehouses were fitted up as a cholera laboratory. As but $300 was available for apparatus, much of the equipment was either made on the station or other articles adapted to laboratory use. After about six months of experimental work a technique was decided upon which it is believed will give accurate and rapid results. Much of the experimental work was an attempt to adopt the newer selective media to quarantine work and to eliminate all but the doubtful and positive cases without using the microscope. This last idea has been abandoned for the present.

Cooperation with other departments: By arrangement with the Boston health department the quarantine station will receive any contagious diseases they wish treated here. One case of smallpox was so cared for.

By arrangement with the medical officers detailed for immigration duty the station will receive at their request non-quarantinable contagious diseases.

By arrangement with the marine hospital at Chelsea the station will receive any acute contagious disease from that hospital. During the year the marine hospital sent the following cases: Chicken pox 1, measles 3, suspected diphtheria 1.

Although new methods of procedure have been adopted in several instances based on experimental work done, this work is being continued with the hope of still further improvement.

Rat proofing: Realizing that it may not always be possible to exclude bubonic plague by quarantine methods, the Boston building commissioner, the health department, and the chamber of commerce have been approached to impress on them the advisability of requiring all new buildings, at least in the water front district of the city, to be of rat-proof construction. An attempt is to be made at the next session of the legislature to get the necessary rat proof and fireproof laws.

The Boston health department is cooperating by examining for plague rats brought to their laboratory. The number so examined is small, but the work is exceedingly valuable.

Transactions: During the fiscal year ending June 30, 1916, a total of 642 vessels entered quarantine as follows:

Steamers	621
Schooners	12
Barks	3
Ship	1
Barges	2
Motor ships	3
Total	642

Of this number 91 required fumigation and were treated as follows:

Fumigated with sulphur	46
Fumigated with hydrocyanic acid gas	32
Fumingated with sulphur and hydrocyanic-acid gas	13
Total	91

The above vessels carried passengers as follows:

First-class passengers	700
Second-class passengers	1,882
Third-class passengers	16,780
Total	19,362

The following number of detained persons were treated in hospital:

Observation	9
Bubo (observation on account of plague)	7
Measles	5
Chickenpox	4
Beriberi	4
Typhoid	1
Malaria	1
Smallpox	1
Tonsilitis	1
Total	33

Brunswick (*Ga.*) *quarantine.*—Acting Asst. Surg. R. E. L. Burford in charge.

During the year 6 vessels were spoken and passed, 18 steamers and 15 sailing vessels were inspected and passed, and 11 steamers and 23 sailing vessels were fumigated and passed. There were 1,002 crew on steamers, 435 crew on sailing vessels, 2 passengers on steamers. No vessel was quarantined and no vessel detained for a longer period than required for inspection and fumigation. No sickness was found on the vessels inspected and none developed while vessels were in port.

Cape Charles quarantine.—Post-office and telegraphic address, Fort Monroe, Va. Acting Asst. Surg. Ward B. MacCaffry in charge.

Transactions.

Vessels inspected and passed	1,851
Vessels fumigated to kill rats	136
Dead rats found after fumigation	1,892
Total officers and crew	75,604
Total passengers	1,101
Vessels held for diagnosis of cases	1

No quarantinable diseases were encountered during the year.

The number of vessels passing through quarantine at this port increased 50 per cent over last year.

Cape Fear quarantine.—Post-office and telegraphic address, Southport, N. C. Surg. M. K. Gwyn in charge.

Transactions.

Total vessels entering quarantine	39
Total steamers inspected and passed	24
Total sailing vessels inspected and passed	4
Total vessels fumigated	11
Steamers fumigated	9
Sailing ships fumigated	2
Total number of crew inspected	1,022

Owing to the European war shipping at this port was greatly reduced during the past year. Several fertilizer factories, which under normal conditions import different kinds of ore from Spain and Portugal and large quantities of potash salts from Germany, have curtailed their operations to a minimum on account of inability to secure bottoms. The same conditions apply to the lumber and cotton trades, and these commodities have to a great extent been shipped by rail. For several years the principal quarantine work at this station has been the handling of vessels bringing nitrates from South American ports; only two nitrate vessels entered the port of Wilmington this year.

Charleston, S. C.—Surg. H. M. Manning in charge.

The amount of shipping at this port has been less than usual on account of the war and the blocking of the Panama Canal. The vessels from the west coast of South America with nitrate are still the most important that enter here from a quarantine point of view.

Charleston has also become a coal port of some importance, and a number of vessels call here for bunker coal, and quite a good deal of coal is being exported to the West Indies. No doubt this trade will increase.

The following is a tabulated statement of the quarantine transactions at this port:

Vessels entering quarantine	113
Steamers inspected and passed	93
Sailing vessels inspected and passed	20
Vessels fumigated	17
Steamers fumigated	10
Sailing vessels fumigated	7
Number of crews inspected	3,127
Number of passengers	48

The station has been receiving smallpox patients from the city of Charleston as during the preceding year, the city paying all expenses incident to the care of these patients. Smallpox has not been nearly so prevalent as during the previous year.

The following is a tabulated statement of the cases of smallpox treated during the year:

Number of smallpox patients treated	29
Number under treatment at end of last fiscal year	7
Number received during the year	22
Male, colored	17
Female, colored	12
Number discharged recovered	29
Number of days of hospital relief	253

Columbia River (Oreg.) quarantine.—Post-office and telegraphic address, Astoria, Oreg. Surg. H. G. Ebert in charge.

During the year 32 steamers and 60 sailing vessels were inspected, 11 being fumigated, and 2,733 crew and passengers were inspected.

There has been no case of quarantinable disease during the fiscal year at this station.

Nine cases of beriberi were found aboard one vessel arriving in March, and under the regulations these were reported to the local health authorities of Portland, Oreg., the vessel's destination. The vessel was a sailing vessel from Europe via Cape Horn.

The regular fumigation for the destruction of rats has been carried out here as usual, and antirat precautions have been enforced as usual in Portland by the harbor police.

New members of crews of cannery vessels were vaccinated as heretofore before sailing.

There has been a marked decrease this year in the number of vessels boarded. Last year 54 steamers and 87 sailing vessels were boarded, totaling 141, against 32 steamers and 60 sailing vessels, totaling 92, this year, showing a loss of 22 steam and 17 sailing vessels, total loss being 39 vessels, or less than three-quarters of last year's work.

Coos Bay quarantine.—Post-office and telegraphic address, North Bend, Oreg. Acting Asst. Surg. Ira B. Bartle in charge. No transactions.

Cumberland Sound quarantine.—Post-office and telegraphic address, Fernandina, Fla. Acting Asst. Surg. J. Louis Horsey in charge.

The total number of vessels arriving at Fernandina during the fiscal year was 53, with a total of 738 in crews and 3 passengers, 12 vessels being spoken and passed, 31 inspected and passed, and 10 fumigated for destruction of rats.

No quarantinable diseases were found and no sickness of other character developed while vessels were at quarantine.

Darien, Ga.—Acting Asst. Surg. C. J. Woods in charge.

During the year 15 vessels have been inspected, all bound for Sapelo, Ga. All carried ballast and were in good sanitary condition, the absence of rats being especially noticeable; none required fumigation. The health of crews was very good and no case of illness of any consequence occurred while they were in port. Bills of health presented by all were clear.

As nothing but freighters enter these ports there was no inspection of aliens, and the duties of the acting assistant surgeon are confined to inspection and fumigation of vessels when necessary.

No epidemics have occurred in or near Darien or Sapelo during the fiscal year.

Delaware Bay and River quarantines.—Post-office and telegraphic address, Marcus Hook, Pa. Senior Surg. Fairfax Irwin in charge.

During the fiscal year ended June 30, 1916, the quarantine work on the Delaware River, with the exception of that done at the breakwater, has continued to be conducted at Marcus Hook in conjunction with the work of the State officials there. The system of joint inspection began in March, 1913, and continues to give satisfaction to the shipping interests of the port of Philadelphia. The greater part of the fumigation of vessels for the destruction of rats, at this station, has continued to be done by the sulphur method, as the steamer *Neptune*, transferred to New Orleans, has not been returned to the station. A good part of this fumigation is carried out at the docks on account of cargoes of inward bound vessels that could not be done at Marcus Hook. Some vessels have been fumigated by the cyanide process.

There was an increase of 201 vessels in the total number arriving at Marcus Hook, as compared with the previous fiscal year—an increase of about 17.5 per cent. Of this increase, 72 were sailing vessels and 129 were steamers.

The number of fumigations during the year increased in still greater proportion. There were 359 vessels fumigated, as compared with 216 during the previous year, which would be an increase of a little more than 60 per cent. The increase in vessels fumigated was made up of 48 sailing vessels, mostly from West Indian ports with logwood, and 95 steamers. The fumigation of one fruit steamer each week from Santa Marta, Colombia, would account for nearly half the increase in steamers fumigated, while the remaining half was due to the general increase in the number of vessels arriving at the port.

The battleship *Tennessee* and the Navy transport *Hancock* were fumigated with cyanide gas, as was the Coast Guard cutter *Itasca* at Marcus Hook and the cutter *Seneca* at New York. Cyanide gas was used to some extent in compartments above deck of vessels whose holds were fumigated with sulphur.

Of the 359 vessels fumigated, 177 were done at Marcus Hook on arrival and of the balance (182 vessels) 100 were done in Philadelphia at the docks, and the remaining 82 at Marcus Hook after unloading.

No quarantinable diseases were found during the year.

The steamer *George Pyman*, from Barcelona, Spain, was remanded to this station for disinfection, a case of smallpox having been landed at the quarantine station at Delaware Breakwater. This vessel was disinfected with sulphur dioxide and formaldehyde, after which it was released. The crew were vaccinated and held 14 days.

The night inspection of vessels has been continued as before.

Reedy Island quarantine station.—There are 18 buildings at the station, large and small, including the hulk *Lancaster* as a building, 5 of which are for the purpose of caring for persons in quarantine, as follows:

Isolation hospital, size 53 feet by 34 feet 8 inches, one story, which is divided into four wards, nurses' room, dining room, kitchen, and storeroom; capacity, 15 beds.

Hospital building, size 56 feet 8 inches by 27 feet 8 inches, divided into nurses' room, dispensary, kitchen, toilet, and bath, and one ward; capacity, 15 beds.

The hulk *Lancaster* is equipped with 548 iron standee bunks, 80 double and tripple deck iron beds, and 23 staterooms with single bunks; capacity, 748.

The total sleeping capacity of the station at present is 897 persons.

Attention is invited to the necessity of a laundry equipment at this station and for the building of a crematory. These buildings will certainly be necessary if the station is to be used for the disembarkation of immigrants to undergo detention.

Summary of transactions at Marcus Hook quarantine station (and Philadelphia) for the fiscal year ended June 30, 1916.

Number of sailing vessels inspected and passed	84
Number of sailing vessels fumigated for rat destruction	64
Number of steamers inspected and passed	904
Number of steamers fumigated for destruction of rats	295
Number of vessels spoken and passed	5
Number of crew on sailing vessels	1,608
Number of crew on steamers	34,278
Number of passengers on all vessels	245
Number of steamers disinfected because of quarantinable disease	1
Number of crew detained because of quarantinable disease	26
Number of crew vaccinated because of quarantinable disease	26
Number of vessels fumigated at agents' request	10

Delaware Breakwater quarantine.—Post-office and telegraphic address, Lewes, Del. Acting Asst. Surg. George G. Hart in charge.

During the year 5 vessels were spoken and passed and 47 vessels inspected, 1 being fumigated. There were also 1,157 passengers and crews on these vessels inspected.

Eastport (Me.) quarantine.—Acting Asst. Surg. John E. Brooks in charge.

There were 794 steamers and 50 sailing vessels examined and passed at this port during the year ending June 30, 1916. These vessels carried 29,372 passengers and 27,356 crew. In addition to the above vessels, hundreds of smaller craft, motor and sailing, visit this port from all parts of New Brunswick and Nova Scotia. These small craft often carry 20 or more passengers, most of whom come here to trade, but many also come to take steamer or train for points farther west.

Smallpox has not been reported in this vicinity during the fiscal year. There has been an absence of diphtheria and scarlet fever from the city.

Port sanitary statements, Form 1964, were given to all vessels going to foreign ports. A copy of Bulletin No. 64, covering quarantine regulations, was placed in the hands of all masters of vessels entering this port.

Eureka, Cal.—Acting Asst. Surg. Charles C. Falk reports that during the year 21 vessels were inspected and passed.

Everett, Wash.—Acting Asst. Surg. James Chisholm in charge.

During the year 1 vessel was inspected and passed, carrying a total of 31 passengers and crew.

Galveston (Tex.) quarantine.—Surg. R. L. Wilson in charge.

The station is located on the north end of a strip of filled land in Galveston Harbor, known as Pelican Spit. The nearest wharves at Galveston are almost 2 miles distant. From the station eastward across the ship channel is the northeast point of Galveston Island, on which are located the south jetty, the State quarantine station, the Fort Point plant of the United States Engineer Department, and somewhat in the distance Fort San Jacinto. To the north and northeast across the Texas City channel are Port Bolivar, Fort Travis, and the north jetty. To the west lies Pelican Island, and 6 miles distant is Texas City. South is the continuation of Pelican Spit, the Galveston ship channel, and across the channel the city of Galveston.

History: The building of the Galveston quarantine station was provided for by act of Congress of 1906 in connection with an appropriation for the prevention of the introduction of yellow fever and other quarantinable diseases into the United States. In 1910 the present site on Pelican Spit was selected, and work was begun in 1911. The buildings were practically completed in 1912 and within the two following years a sewerage and water distribution system was installed and connection made with Galveston for water, electric current, and telephone service.

The station was supplied with sufficient personnel and other equipment and was opened on July 19, 1915. August 16 and 17, 1915, a disastrous hurricane visited Galveston, washing out some of the filling at the station, displacing some of the riprap, and tearing off the top of the wharf but doing little damage to the buildings. The total cost of the station to the time of opening was approximately $200,000.

Before this station was opened the quarantine work was entirely in the hands of a State quarantine service, with an inadequate plant for disinfection, detention, or treatment. The State collected fees from vessels for inspection and fumigation, a tax that the shipping interests at Galveston have long been desirous of being relieved of. The State still maintains its quarantine and fees are still being collected. Priority in boarding and treatment of vessels is exercised by the United States Public Health Service.

The reservation comprises about 25½ acres, more than one-half of it being shoal water. About 3½ acres, on which the buildings are located, has been closed in with a wooden bulkhead, mostly creosoted, and protected by stone surmounted by large granite riprap. Within the bulkhead the sand fill from dredging was covered with about 4 inches of loam, in which Bermuda grass was planted. Some of this topsoil and fill has been washed away. The top of the lawn is from 10 to 11 feet above mean low water, and floors of buildings are about 13 feet from such level.

The buildings, all frame structures, are nine in number and one story. In addition, there is a wharf with several small structures. Eight of the buildings are erected on 30-foot creosoted piles with sills and joists well bolted to piling. Most of the buildings have capacious galleries entirely mosquito screened.

Water supply and drainage: The water supply is from artesian wells piped from Galveston. There is one high tank reservoir connected with the city supply and two small tanks for roof water. For additional fire protection, harbor water is pumped in the fire mains. Storm water and sewage drain by separate systems into the bay.

Lighting: Electric current was supplied from Galveston until the hurricane of last August. Kerosene lamps are being used temporarily, pending the installation of an electric generator.

Telephone service: The cable to Galveston was broken some time ago. Several of the buildings are connected by telephone. An electric bell system connects the offices with the wharf landings and rear of executive building.

Heating is effected by stoves and fireplaces.

Building No. 1, attendants' quarters: Floor area 1,512 square feet. Consists of 5 bedrooms, 1 sitting room, 1 toilet and bathroom.

Building No. 2, storehouse of 2 rooms: Floor area 864 square feet. One room is used to store serviceable and unserviceable property, the other room is the carpenter shop.

Building No. 3, barracks for cabin and steerage passengers: Floor area 3,312 square feet. Consists of 4 large bedrooms for cabin passengers, large dormitory for steerage passengers, toilets, showers, and baths. Ordinary accommodation 50 people, but 25 to 50 people additional can be accommodated in suitable weather by using galleries and halls. The dormitory should have two-tier bunks to further increase accommodation.

Building No. 4, hospital: Floor area 1,872 square feet. Consists of 3 wards, capacity ordinarily 4 beds each with toilet and bathroom for each. In addition, there is a diet kitchen, nurse's room, and storeroom.

Building No. 5, oil house: Floor area 150 square feet. Consists of one room in which is stored oils and paints.

Building No. 6, storm refuge: This structure consisted originally of a platform of about 8 by 8 feet, 15 feet high, resting on four legs of 10 by 10 pine bolted to deep-driven creosoted piles. Following the hurricane of last year the need of storage of fresh water for emergencies being emphasized, a cypress tank of about 10,000 gallons capacity was placed on this tower. The practical use of the tower as a storm refuge is questionable.

Building No. 7, disinfecting house: Floor area 2,700 square feet. Consists of 1 room in which are placed 2 steam disinfecting chambers 4 feet 6 inches in diameter by 16 feet long connected with a 15-horsepower upright boiler, 1 salt-water fire pump, engineer's workbench, disinfectants—sodium cyanide, sulphuric acid, sulphur—containers for fumigants, dutch ovens, fans, barrels, etc.

Building No. 8, executive building: Floor area 2,788 square feet. It consists of 2 principal portions divided by a hallway. The front part consists of the medical officer's and pharmacist's offices, laboratory, drug room, and pharmacist's living quarters (2 rooms). The rear portion consists of a station kitchen with a double range, station dining room, the pharmacist's dining room, and a small storeroom. The dining room will seat about 25 people. In suitable weather in summer additional tables are used on the galleries adjoining the dining room.

Building No. 9, junior medical officer's quarters: Floor area 1,872 square feet. Consists of 2 bedrooms, sitting room, dining room, bathroom, kitchen, maid's room, and large hall.

Building No. 10, quarters of medical officers in charge: Floor area 2,900 square feet. Consists of 3 bedrooms, sitting room, dining room, bathrooms, kitchen, maid's room, and 2 large halls.

The station wharf: This structure is 300 feet long by 16 feet wide and is erected on creosoted piling. The wharf is protected by eight 65-foot 7-pile dolphins, creosoted. Two boat landings are provided on the wharf. There is about 22 feet of water at the outside of the dolphins at mean low tide.

Floating property: One gasoline launch named *Seaway* belongs to the service. Its length is 46 feet, beam 10 feet 3 inches, draft 4 feet, Sterling engine, horsepower 45. There is a cabin forward which will seat comfortably 8 people. Aft there is a cockpit which will seat about 12 people. The launch is a one-man control with steering wheel amidship.

Personnel: There are 2 medical officers and 1 pharmacist detailed at the station. The employees number 14.

Fumigation of vessels is done by sulphur burnt in pots or by hydrocyanic-acid gas. Cargo vessels are always better treated with cyanide. At present prices sodium cyanide is found more economical.

For barrels in the holds in cyanide fumigation bails of three-eighths-inch round iron are attached by boring holes in the barrel about 3 inches from the top and bending the end of the iron back over the stave so that the bail always keeps erect. In this way the hook of the wench can catch the bail easily after fumigation is finished so that there is no necessity of a man going into the hold.

Stone crocks of 2 and 6 quart capacity are found to be cheap and serviceable. Jugs of 1 and 2 gallon sizes are found convenient to handle sulphuric acid to the ships. The jugs are hoisted in barrels or buckets.

Transactions.

Steamers inspected and passed	351
Sailing vessels inspected and passed	16
Coastwise vessels boarded and passed	140
Steamers inspected and held in detention	10
Sailing vessels inspected and held in detention	1
Steamers fumigated inbound	109
Steamers fumigated outbound	5
Sailing vessels fumigated	2
Vessels fumigated with sulphur	96
Vessels fumigated with cyanide	20
Vessels fumigated with cargo	12
Vessels fumigated in ballast	104
Vessels fumigated for rats	107
Vessels fumigated for mosquitoes	9
Total vessels fumigated	116
Number of rodents collected after fumigation	1,657
Number of crew inspected	16,314
Number of passengers inspected	1,319
Number of persons detained at station	238
Number of suspected cases treated in station hospital	24
Number of temperatures taken, crew	3,075
Number of temperatures taken, passengers	1,319
Total number of vessels entering quarantine	635

Georgetown, S. C.—Acting Asst. Surg. M. P. Moorer in charge.

There were 2 vessels, carrying crews totaling 16, inspected and passed.

The service property at this station, while not extensive, is in a good state of repair, with the exception of wire screens for windows and doors, an exigency which has been provided for by the Supervising Architect.

Should the emergency arise, these buildings would provide excellent accommodation for a detention hospital for contagious diseases, by reason of arrangement and isolation.

No repairs or new construction have been made during the fiscal year and the only expenditures have been for salary of attendant and telephone rent and the latter has been discontinued.

Gulf quarantine.—Post-office and telegraphic address, Biloxi, Miss., Acting Asst. Surg. W. R. P. Thompson in charge.

Transactions.

Sailing vessels entering quarantine	87
Steamers entering quarantine	36
Total vessels entering quarantine	123
Vessels inspected and passed	37
Vessels spoken and passed	9
Vessels fumigated and passed	77
Vessels held for observation	2
Total crew inspected	1,801
Stowaways inspected	1
Rats killed by fumigation	704

Great numbers of cockroaches and bedbugs were also killed.

The station was visited by two severe hurricanes, one each in August and September, 1915. The first storm caused no serious damage to the station proper, though washing away a number of sand dunes on the Gulf side of the island. The second storm was much more severe. All the remaining sand hills on the Gulf shore, which had previously afforded considerable protection to the station buildings, were swept away. The approaches to the lagoon bridge were destroyed. The landing stages along the main wharf were swept away. The fences, where exposed to the strong Gulf to Sound current, were floated out. This same current washed away a large part of a large sand dune in front of the hospital and also cut a channel through a similar dune west of the medical officer's quarters. This cutting away of these dunes exposes these quarters and a number of the station buildings to severe damage from future hurricanes. Considerable damage was also done to the bulkhead protecting the quarters of the medical officer from the Sound. Had the wind shifted to the northwest for any considerable length of time, these quarters would have been damaged or perhaps wrecked.

The September storm was followed on the following day by an invasion of snakes and marsh animals and fowl. An immense field of logs, grass, and other débris, apparently washed down from the flooded marshes when the storm subsided, grounded about the island. The logs were thickly populated with snakes, mostly moccasins, raccoons, mink, otter, muskrats, etc. The snakes twined about the boat fittings, wharf timbers, etc., and escaped to the shore in great numbers At least 300 were killed within the first week, half of them on and near the station proper upon the first day of their arrival. Many more were killed up to cold weather and for many weeks it was dangerous to go about the grounds at night.

There was no loss of life and, other than that above mentioned, there was little loss of property from the storms.

The greater part of the time not strictly required for quarantine work during the past year was devoted to repairs after the hurricanes and to continuing the rebuilding of walks, fences, etc., which are now in generally good condition.

Hoquiam (*Wash.*).—Acting Asst. Surg. R. F. Hunter reports that there were no transactions.

Ketchikan, *Alaska.*—Acting Asst. Surg. H. C. Story in charge.

During the year 216 vessels were inspected and passed, carrying a total of 11,877 passengers and crews, and 781 port sanitary statements were issued.

There has been notified but three cases of measles at this station during the year. One case was brought here from Seattle, one case from the United States Coast and Geodetic Survey steamship *Patterson*, and one case in transit on the steamship *Spokane* northward bound. This last-mentioned case was isolated, proper precautions taken to prevent its spread, and the stateroom fumigated after the patients disembarked at Skagway.

There has been an epidemic of chicken pox, but the cases have been so mild in character that only in a very few instances has a physician been called to administer.

There are between 300 and 400 Indians in this vicinity, and the insanitary condition in which they live predisposes to disease not only among themselves, but the community. They live in houses in which not even a broom is used, sleep on the floor, cook their meals in most cases in a pot that hangs over a fire and help themselves to the contents with hands that are never washed. Personal cleanliness is not practiced, and in some instances several families live in one small room.

Key West (Fla.) quarantine.—Acting Asst. Surg. S. D. W. Light in charge.

During the fiscal year a total of 689 steam vessels, carrying crews aggregating 35,605 and 24,352 passengers, and 63 sailing vessels, with a total of 493 crew and 61 passengers, arrived at this station from foreign ports, 17 steamers and 27 sailing vessels being fumigated for the destruction of rats, vermin, etc., and 2 steamers were held in quarantine.

Smallpox was the only quarantinable disease encountered during the year, and one person with this disease was taken from the U. S. S. *Jacob Jones* and isolated on the floating hospital *Wistaria* pending his recovery and subsequent discharge.

On June 26, 23 refugee passengers from Progreso, Mexico, were taken off the Danish steamship *Jelling* and isolated on the floating hospital *Wistaria* to complete six days from their date of embarkation at the Mexican port.

The personnel of the station consists of one acting assistant surgeon and two attendants, and the equipment of a supply of disinfecting material, sulphur pots, and a boarding launch. A stationary "shore disinfecting plant" was sold at public auction during the fiscal year.

Mobile (Ala.) quarantine.—Post-office and telegraphic address, Fort Morgan, Ala. Acting Asst. Surg. J. F. Lancaster in charge.

Few changes in the routine station work have been made. The number of vessels entering this station totaled 567, a decrease of 41 from the previous year. The number fumigated was 152, a decrease of 17 from the previous year. The vigorous antirat measures adopted in 1914–15 have been continued, as well as close inspection of all vessels from suspected ports for typhus and cholera. After the fumigations 1,055 dead rats were found.

Transactions.

Vessels inspected and passed	408
Vessels inspected and detained	7
Vessels inspected and fumigated	152
Total vessels inspected	567
Total passengers and crews on vessels	10,896

New Orleans (La.) quarantine.—Surg. G. M. Corput in charge.

The New Orleans quarantine station is located on the east bank of the Mississippi River 90 miles below New Orleans. The reservation consists of approximately 2,000 acres, all very low and mostly marsh. The work of the station is at all times heavy, and on account of its nearness to numerous ports infected or suspected of being infected with yellow fever, typus fever, and plague its operation at all times requires extreme vigilance.

Two officers board all ships and both make the inspection in order to obviate the possibility of one or the other overlooking some detail of the work. Careful thermometric and visual examinations are made of each passenger and member of crew. The various compartments of the vessel are inspected and special attention given to sanitary conditions, screening of living quarters, the evidence of rats, mosquitoes, bed bugs, or other vermin.

On August 16, 1915, the station was swept by a tropical storm of considerable intensity and much minor damage done.

On September 29, 1915, the station was swept by another hurricane of extreme intensity and very extensive damage resulted, this being estimated at $40,000. All station wharves were destroyed and all buildings more or less damaged. Since then the main wharf has been rebuilt, but only minor repairs have been made to the rest of the station, this being due principally to lack of available funds and also to the fact that the moving of the station to a more advantageous site was being considered.

The station is therefore in a very bad condition and woefully inadequate to the needs of the service.

One case of smallpox was treated in the station hospital during the year and 251 refugees were quartered and fed at the station.

Transactions.

	Number of ships.	Tons.	Crew.	Passengers.	Refugees.
Steamers inspected and passed	1,233	3,516,108	49,421	11,376	....
Steamers fumigated and passed	117	457,924	5,389	27	....
Steamers inspected and detained to complete 6 days	55	106,530	1,326	233	202
Steamers fumigated and detained to complete 6 days	4	3,576	85	....	49
Steamers fumigated and detained 6 days	7	23,609	234	4	....
Steamers detained for diagnosis	2	3,148	52	4	....
Crew and passengers detained for 14 days account smallpox	....	....	34	....	....
Steamers remanded to New Orleans for fumigation	75	260,581	2,991	11	....
Sailing vessels inspected and passed	9	6,674	96	....	....
Sailing vessels fumigated and passed	18	18,744	271	....	....
Sailing vessels fumigated and detained 6 days	6	4,325	60	....	....
Sailing vessels remanded to New Orleans for fumigation	1	722	11	....	....
Naval vessels passed on medical officers' certificates	7	....	....	....	....
Total	1,534	4,401,941	59,970	11,655	251
Vessels spoken and passed	177	....	....	....	....
Total number of vessels	1,711	....	....	....	....
Temperatures taken	726	....	31,457	7,458	168
Cases sick in hospital	....	....	1	1	1
Vessels fumigated	152	508,178	6,039	31	49

Nome, Alaska.—Acting Asst. Surg. Newman in charge. No transactions.

Pascagoula (Miss.) quarantine.—Acting Asst. Surg. W. A. Cox in charge.

Report of service transactions at the station for the year follows:

Vessels arriving from foreign ports	80
Vessels inspected and passed	64
Vessels fumigated	16
Officers and crew	612
Passengers (officers' families)	8

This shows a notable increase over the transactions of like character for the previous year. Character of vessels remain practically the same. No case of quarantinable disease was met with during the year, and the routine work calls for no special mention.

On but one vessel have dead rats been found after fumigation—this the Norwegian bark *Solheim*, from Havre, France, fumigated on May 14, 1916. As a result of this fumigation 39 dead rats were found.

Pensacola (Fla.) quarantine.—Acting Asst. Surg. Wyatt Barnes in charge.

Transactions.

Vessels entering quarantine:	
Steamers	101
Sailing vessels	140
Total	241
Inspected and passed	181
Fumigated and passed	59
Inspected and detained	1
Persons examined:	
Officers and crew	3, 377
Passengers	22
Shipwrecked seamen	3
Stowaways	6
Total	3, 408

Perth Amboy (N. J.) quarantine.—Acting Asst. Surg. Charles W. Naulty, jr., in charge.

The maritime commerce of this port is unusually responsive to foreign affairs. Eight years ago the principal cargoes were bullion from Mexico and asphalt from Trinidad and Venezuela, but prior to the war in Europe the port was rapidly developing a general commerce from all over the world. This year 45 per cent of vessels entering carried crude oil, mostly from Tampico and Tuxpam, Mexico. About 40 per cent of the remaining vessels brought copper or iron ore. The balance of the cargoes was largely asphalt.

None of the vessels entering this port direct carry passengers and the cargoes do not make desirable harborages for rats, thereby making the quarantine procedures correspondingly easier. There were no cases of quarantinable diseases arriving at this station during the year.

The present station building, which is owned by the city of Perth Amboy and leased by the board of harbor commissioners, is extremely in need of painting both inside and out. The harbor board has agreed to have conditions remedied and the building wired for electric lights and, if possible, the building itself moved bodily to a new position on the bulkhead.

Vessels have been fumigated on arrival and rat guard notices served upon the master and the assistance of the customs inspectors enlisted to see that the proper precautions are observed while at the dock.

The Trinidad Line stops at New York and discharges passengers and miscellaneous cargo there and is remanded here for discharge of asphalt and fumigation to prevent unnecessary delay. This company has supplied every boat with a complete equipment of pots and pans and sulphur and alcohol, and the fumigation is done by their own officers under supervision of the service officer or a service employee.

Transactions.

Steamers inspected and passed	113
Sailing vessels inspected and passed	3
Steamers spoken and passed	1
Total	117
Passengers on steamers	11
Crews on steamers	2,964
Crews on sailing vessels	35
Total	2,999
Steamers fumigated	20
Sailing vessels fumigated	2
Total	22

Port Angeles (Wash.) subport.—Acting Asst. Surg. Frederick T. Hunter in charge.

During the year 18 sailing vessels were inspected and passed, and 1 was fumigated for rat destruction at this station during the fiscal year. One sailing vessel was inspected and directed to proceed to the quarantine station at Diamond Point, Wash., for fumigation. These vessels carried a total of 232 members of crews and 11 passengers.

Port Hartford, Cal.—Acting Asst. Surg. C. J. McGovern in charge.

During the fiscal year there were inspected at this port 54 steamers, carrying a total of 2,162 in crews. There were no quarantinable diseases discovered, nor were there any other transactions.

Port Inglis (Fla.) quarantine.—Acting Asst. Surg. B. W. Burland in charge.

During the year 2 vessels, carrying a total of 52 passengers and crews, were inspected and passed.

Portland (Me.) quarantine.—Surg. H. S. Mathewson in charge.

During the year 231 steamers and 35 sailing vessels were inspected and passed, and 3 steamers and 9 sailing vessels were spoken and passed. These vessels carried 45 passengers and 8,690 members of crews. Eight vessels from ports infected with plague were disinfected for the destruction of rats, 117 dead rats being collected from various parts of these vessels and autopsied, but no evidence of plague infection was found among them.

Port Royal (S. C.) quarantine.—Acting Asst. Surg. William P. Gibbes in charge.

One vessel, carrying a crew of eight men, was inspected and passed without fumigation.

Port Townsend (*Wash.*) *quarantine.*—Passed Asst. Surg. Baylis H. Earle in charge.

During the year 208 steamers were inspected and passed and 19 detained and 68 sailing vessels were inspected and passed and 37 detained. The steamers carried a total of 18,449 members of crews and 15,815 passengers and the sailing vessels a total of 1,567 members of crews and 26 passengers. The vessels detained were fumigated with sulphur dioxid gas by the pot method for the destruction of rats and other vermin. The work was done in the bay of Port Townsend, except in the case of the United State Coast and Geodetic Survey steamer *Patterson*, which was sent to the Diamond Point quarantine station at request of the commanding officer, one member of the crew being ill of scarlet fever. Provisional pratique was granted 53 steamers and 1 sailing vessel bound for Seattle and 8 steamers bound for Tacoma, with the understanding that they would be fumigated at these ports when empty, the service officers there being notified by telegraph or letter. One sailing vessel was fumigated at Port Gamble, Wash., an officer with necessary apparatus being sent there on the launch *Wightman* for the purpose.

Transactions.

Steamers inspected and passed	208
Steamers detained	19
Sailing vessels inspected and passed	68
Sailing vessels detained	37
Number of crews on steamers	18, 449
Number of crews on sailing vessels	1, 567
Number of passengers on steamers (including 31 stowaways)	15, 815
Number of passengers on sailing vessels (including 1 stowaway)	26

Providence, R. I.—Passed Asst. Surg. E. R. Marshall in charge.

Despite the unsettled conditions in Europe, due to the war, the shipping at this port has increased somewhat over the volume of last year, both in passengers and freight.

No quarantinable diseases have been encountered during the year among the crews and passengers of the incoming vessels.

The Fabre Line vessels, which bring all the immigrants to this port, have not touched at Mediterranean ports for the greater part of the present fiscal year, which greatly lessened the chances of bringing any of the quarantinable diseases. The steamer *Roma* arrived October 15, 1915, from Lisbon and the Azores with two cases of measles in the steerage, and again on May 12, 1916, from the same ports with one case of measles and one case of varicella. These cases were sent to the Providence City Hospital and the quarters and bedding fumigated. Statistical table of quarantine transactions is appended.

Work performed and equipment installed on the *Newark* during the fiscal year ended June 30, 1916, was as follows:

Heating system: The old system on the berth deck, which was installed at the Norfolk Navy Yard, has been torn out and replaced by a new overhead circulating system. The old system was not properly graded, no provision had been made for bleeding the pipes in the cold weather, and the radiators were either badly corroded or broken. This work was performed by the station force at an approximate cost of $100 for material.

Lighting system: One of the old dynamos located below the berth deck has been hauled up, with considerable effort, and installed in the alleyway leading to the boiler room. The dynamo has been overhauled and belted up to one of the old blower engines, which serves the purpose very well. A very elaborate switchboard has been built by the attendants, and the vessel has been rewired on both decks from stem to stern. The dynamo as now installed will carry about 200 tungsten lights with a boiler pressure of 80 pounds.

The station engineer and his helpers deserve the greatest credit for their very efficient work and untiring energy in installing this lighting equipment, for it has obviated the necessity for spending $2,000 for a new dynamo. The total cost in this connection was about $40.

Shower baths: This system is located in the peak of the vessel on the gun deck, and consists of two batteries of six showers each. In cold weather the water will be heated by means of two Gegenstrom mixing chambers, which receive a supply of steam direct from the donkey boiler. These showers are supplied from a tank of 2,500 gallons capacity, located on the boat deck, which under ordinary circumstances will be ample.

Miscellaneous: The force of attendants have performed, in addition to the above, a great deal of miscellaneous work. The forward and after decks, not covered by the roof, have been repaired, caulked, pitched, painted, and covered with heavy canvass, which was given two coats of drab paint. Numerous tables, benches, and lockers have been built for the convenience of those who may be detained in quarantine. Range, water-closets, urinals, bathtubs, and sinks have been installed at a cost of approximately $600.

The fire system has been completely overhauled and with 60 pounds of steam on the donkey boiler it is possible to cover the whole length of the vessel in a very satisfactory manner.

Transactions.

Vessels entering quarantine	35
Steamers inspected and passed	18
Sailing vessels inspected and passed	17
Sailing vessels inspected and fumigated	2
Total number of crews inspected	1,285
Total number of passengers inspected	4,609
Number of port sanitary statements issued	20

Reedy Island quarantine station.—Post-office address, Port Penn, Del.; telegraphic address, Reedy Island, Del. Pharmacist F. L. Brown in charge.

This station is maintained as the detention station of the Delaware Bay and River quarantine, for the purpose of holding under observation and the treatment of passengers and crews, and the fumigation of suspected and infected vessels, in order to prevent the introduction of contagious diseases into the United States. The present equipment will care for 900 people, but the capacity should be increased. The services of the station have not been required during the past fiscal year, which no doubt, is due to the decrease in the number of ships arriving, and the cessation of the arrival of immigrants to the United States through this port. Various repairs and improvements have been made during the past year to improve the efficiency of the station for quarantine purposes.

St. Andrews (Fla.) quarantine.—Acting Asst. Surg. J. A. Wells in charge.

During the fiscal year there has entered this port from foreign ports a total of 57 vessels, and of that number 50 were sailings vessels and barges and 7 were steamships. Of the total vessels entering quarantine it was necessary to fumigate 17, all fumigations being for rodent destruction. No communicable or quarantinable diseases were found on any of the above vessels.

The above is an increase over the number of vessels entering this port during the last fiscal year. The increase was due to the exportation of lumber to the West Indies by barges. Large seagoing tugs at times have as many as three or four barges in tow for Habana, Sagua la Grande, and other ports of Cuba.

St. Georges Sound quarantine.—Post office and telegraphic address, Carrabelle, Fla. Acting Asst. Surg. J. A. Harper in charge.

The reason that there has been so little shipping from this port for some time is on account of the depression of the foreign lumber trade. There are several large mills which ship from this port in normal times which have absolutely closed down, as they depend exclusively on the foreign trade. However, they intend to start operations as soon as the foreign markets open again, and, from personal observations and the reports of the owners, this port will be more active in shipping that heretofore.

St. Johns River quarantine.—Post office and telegraphic address, Mayport, Fla. Acting Asst. Surg. Neil Alford in charge.

Transactions.

Vessels inspected	103
Vessels fumigated	27
Passengers inspected	543
Crews inspected	3, 301
Stowaways	3

Vessels arrived from foreign ports as follows: Porto Rico, 11; Spain, 8; Cuba, 5; Denmark, 1; Venezuela, 4; Brazil, 5; Nova Scotia, 2; Bermudas, 7; Ireland, 1; Habana (Cuba), 5; Azores, 1; Barbados, 1; Turks Island, 1; Haiti, 1; Nassau, 22; Morocco, 4; Buenos Aires, 1; Mexico, 8; Canal Zone, 3; England, 4; Madeira, 1.

No quarantinable diseases or any of a suspicious nature were found.

Special attention has been given to the deratization of vessels. As shown in the foregoing report, the number of vessels fumigated during the past year, which is 27, exceeds by far the number fumigated in any preceding year.

For boarding and other purposes, as transferring disinfecting material, etc., the station is provided with a gasoline motor launch 25 feet in length. It is in good condition and has been during the past year, needing only slight repairs. The boathouse used for the housing of the launch and for storing sulphur, etc., was leased from the Florida East Coast Railway Co. at a monthly rental of $25.

Office room has been furnished at a monthly rental of $5.

The station has only one attendant, the launch engineer, who assists in fumigations and in taking care of the station property.

Requests were received from 23 employees of the United States Engineer Department in July, 1915, for the antityphoid vaccination.

These requests were complied with, the vaccine used having been furnished by the Hygienic Laboratory, United States Public Health Service.

St. Joseph (*Fla.*) *quarantine.*—Post office and telegraphic address, Port St. Joe, Fla. Acting Asst. Surg. B. S. Stutts in charge.

On account of the European war, conditions during the year just closed have been marked by a notable decrease in the shipping at this port. There were 8 vessels here during the year, with passengers and crews totaling 125. Three were fumigated and eight bills of health were issued.

San Diego (*Cal.*) *quarantine.*—Acting Asst. Surg. W. W. McKay in charge.

During this period 572 steam or gasoline power vessels were inspected, 25 United States Navy vessels spoken and passed, and 1 sailing vessel inspected, making a total of 598 vessels arriving at this station from foreign ports.

The ports of departure were mostly Mexican coast ports, the European war and slides in the Panama Canal having greatly curtailed arrivals from European ports. Conditions in Mexico have caused a falling off during the year of nearly 60 per cent of the regular passenger traffic from that source.

Two vessels were disinfected and 95 pieces of bedding for the United States Army at Fort Rosecrans were disinfected. No case of quarantinable disease was treated at the station during the year.

The number in the crews of vessels arriving was 10,493, and the total number of passengers 1,708.

The handicaps to the station still existing are small size and obsolete pattern of steam disinfecting chamber, no suitable baths or barracks for detention of cabin passengers or suspects.

San Francisco (*Cal.*) *quarantine.*—Post-office and telegraphic address, Angel Island, Cal. Surg. W. A. Korn in charge.

During the year 782 vessels were passed, of which number 762 were inspected and passed, 17 boarded and passed, and 3 spoken and passed. Four hundred and fourteen vessels arrived during the year from plague and cholera ports and 117 vessels from yellow-fever ports. There were 89,204 persons inspected, of whom 40,565 were members of crews of steam vessels, 2,666 members of crews of sail vessels, and 45,973 passengers. Two hundred and fifty-four vessels were fumigated, of which 211 were steam vessels and 43 sail vessels; 84 vessels were fumigated with hydrocyanic acid gas, 19 vessels with both sulphur and hydrocyanic acid gas, the former being used in the holds and the latter in storerooms and living quarters, and 155 vessels were fumigated with sulphur dioxide. One cabin on the steamship *Great Northern* having been occupied by a case of smallpox was fumigated with formaldehyde gas.

As a result of these fumigations, 3,991 rats and 312 mice were killed, identified as follows:

Mus rattus	1,287
Mus alexandrinus	1,550
Mus norvegicus	46
Unidentified	1,108
Mus musculus	312

Sixty-one vessels were not searched for rats after fumigation, chiefly for the reason that they put to sea directly after fumigation.

Fumigants: 130,715 pounds of sulphur, 6,043 pints of sulphuric acid, and 4,404 pounds of cyanide were used during the year. Of the above, all the sulphur, 1,195 pints of sulphuric acid, and 995 pounds of cyanide were supplied by the service.

Since this station adopted the use of hydrocyanic acid gas as a routine fumigant steamship companies generally have requested that this method be used instead of sulphur.

The first vessel fumigated throughout with hydrocyanic acid gas at this station was the American steamship *Matsonia*, on February 19, 1916. From that date to June 30, 1916, 101 vessels were fumigated—72 with this gas and 29 with sulphur.

One advantage of this method is the great saving of time to the vessel, but another important advantage which the cyanide has over sulphur is that it is not necessary to remove stores, provisions, or clothing from the compartments to be fumigated. This is always one of the chief complaints ships' officers make when sulphur is used as the fumigant, as frequently in moving stores rats escape, and vermin are often concealed in clothing. By obviating the removal of these articles from the various compartments, the tendency is toward a more thorough fumigation.

The rapidity of the action of this gas on rodents brings its lesson to those who are engaged in handling it or are exposed to its effects. The utmost care is needed, and stringent precautions must be taken when it is used, especially on vessels with oriental crews. At this station it is the custom, when everything is ready, to require the master or first officer to sign a statement that all the crew are out of the vessel or accounted for. In addition to this, guards are usually stationed at the entrance to the forecastles and holds. Thus far no fatalities have been recorded at this station, but several sailors have been overcome by the gas and removed to hospitals. In each instance, however, it was due to entrance into compartments before the authorized time.

The following list represents vessels carrying the largest number of rats on arrival at this port, which were found after fumigation:

Mexican steamship *Mazatlan*	262
Japanese steamship *Persia Maru*	259
Norwegian steamship *Henrik*	150
Dutch steamship *Karimoen*	127
American steamship *Geo. W. Elder*	120
Japanese steamship *Kwanto Maru*	107
Portuguese steamship *Torridge*	97
Swedish steamship *Suecia*	85
American steamship *Newport*	84
American bark *Geo. Curtis*	80
American steamship *Alliance*	75
Japanese steamship *Tenyo Maru*	74

The provisions of bureau letter of February 15, 1913, relative to the fumigation of vessels upon arrival are being strictly enforced. In regular line vessels, on which results can be checked, the rodent population has been markedly decreased, vessels which formerly yielded from 150 to 250 rats now averaging from 15 to 25. During the year no quarantinable disease was observed.

Los Angeles and subports.—Senior Surg. S. D. Brooks in charge.

This station includes three ports for quarantine inspection of vessels—San Pedro, Redondo, and Santa Barbara (including Gaviota).

Transactions.

	San Pedro.	Santa Barbara.
Steamers inspected	184	
Sailing vessels inspected	3	4
Total vessels inspected	187	4
Vessels fumigated	7	
Total passengers, crews, and stowaways	10,597	69

No case of quarantinable disease was found on a vessel during the year.

Rat guards were placed on all vessels from Seattle and from South American and Asiatic ports while at dock, and daily inspection was carried out to insure their retention. Fumigation of such vessels for destruction of rats was usually deferred on account of perishable cargo or because the holds were completely filled, but all cargo being unloaded was inspected for evidence of rats. Seven vessels were fumigated for destruction of rats during the year.

Savannah (*Ga.*) *quarantine.*—Acting Asst. Surg. William J. Linley in charge.

Two hundred and four vessels, carrying 5,261 seamen and 3 passengers, arrived; 107 were inspected and passed; 64 inspected, fumigated, and released; 2 held pending diagnosis and released; and 2 arriving for orders were held subject to fumigation, but departed for Brunswick, Ga. Ninety-four vessels were required to fend off, use rat guards on lines, etc., while in port. Three hundred and forty-eight dead rats were collected after fumigations and burned in ships' furnaces.

South Bend (*Wash.*) *subport.*—Acting Asst. Surg. Francis W. Anderson in charge.

Two sailing vessels were inspected and passed during the fiscal year ending June 30, 1916. They carried a total of 9 members of crew and no passengers.

Tacoma, *Wash.*—Acting Asst. Surg. F. J. Schug reports that 57 vessels were inspected and fumigated, these vessels carrying a total of 430 passengers and members of crews.

Tampa Bay quarantine.—Post office address, Fort De Soto, Fla. Telegraphic address, via Palmetto, Fla. Acting Asst. Surg. B. B. Blount in charge.

Transactions.

	Number of ships.	Tonnage.	Number of crew.	Number of passengers.	Temperature taken.
Vessels entering quarantine	249	297,327	3,533	55	3,588
Vessels inspected and passed	200	254,931	3,307	55	3,362
Vessels fumigated and passed	45	42,396	226		226
Vessels spoken and passed	4				

No quarantinable disease was found on any vessels during the year. Examination of crew and passengers was made for immigration purposes, of which 10 cases were certified, 1 case being trachoma.

Washington, *N. C.*—Acting Asst. Surg. John C. Rodman in charge. No transactions.

TEXAS MEXICAN BORDER TRANSACTIONS.

Brownsville, Tex.—Acting Asst. Surg. G. D. Fairbanks in charge.

During the year ended June 30, 1916, 4,857 aliens were examined for the Immigration Service and 437 certified as defective; 69,108 others were inspected on crossing to this side, but returned again, and are not classed as aliens. Eighty-nine warrant cases were examined, most of them being prostitutes requiring gynecological examination. Four physical examinations were made for the Coast-Guard Service and four days' medical treatment rendered to men in the same service.

In January a special quarantine against typhus fever was established under the general supervision of Senior Surg. C. C. Pierce. The Mexican authorities disinfect their own citizens under the supervision of a representative of the United States Public Health Service, and it is quite remarkable that no cases of typhus have developed so far in this district nor along the railroad lines running from here. There were 9,618 persons treated, when necessary, at the plant, and 1,694 separate pieces of baggage were disinfected and 2,244 vaccinations made.

Merchandise was inspected and found free of rats and in good sanitary condition, as follows: 2,611 bales of ixtle, 13,598 cowhides, 26,961 goat hides, 608 mixed animal hides, 30 cars of bones, 85 sacks of cow horns, 686 sacks of wool, and 68 bales of cow and horse hair.

Eagle Pass, Tex.—Acting Asst. Surg. Lea Hume, in charge, reports that up to November 15 there were practically no quarantine transactions, inasmuch as there was no through travel from Mexico at that time. However, during November 7,000 Carranzista troops crossed to this side on railway trains going to Douglas, Ariz., and thence to Mexico.

Regular passenger traffic began on December 27, 1915, the first trains from the interior of Mexico arriving at Piedras Negras, Mexico, at that time.

Typhus fever being epidemic in Mexico at the aforementioned period, it became necessary that service guards be placed on the footbridge and that all persons coming from interior Mexican points be examined.

As a result of the typhus situation in Mexico all individuals from there who had been exposed to typhus fever were required to take a gasoline bath and have their baggage disinfected.

There being no disinfecting plant on the American side of the Rio Grande and no provisions having been made for the washing of passengers and the disinfection of baggage, the Mexican consul, Mr. G. M. Seguin, at Eagle Pass, Tex., was interviewed, with a view to obtaining his assistance and cooperation in this matter.

Mr. Seguin stated that the Mexican Government owned in Piedras Negras, Mexico, a disinfecting plant; that he would permit all arrivals in Piedras Negras to be sent there and would issue certificates of disinfection, etc., in compliance with the desires of the service. Accordingly, the plant was put in operation on December 28, and from that date to the present has been used for the purposes set forth, the service furnishing one of the employees.

From the beginning of the typhus-fever epidemic in Mexico, there has been but one case of typhus in Eagle Pass. That case occurred in the person of an alien held for investigation by the Immigration Service in the United States detention quarters. This case made a complete recovery.

Vaccination was instituted on the boundary line here in January, 1916, and all persons crossing to this side of the river who were not protected from smallpox were vaccinated.

Three quarantine guards have been constantly employed at Eagle Pass since the 1st of January, 1916.

No case of smallpox or any other quarantine disease has been observed at this port during the year, except the case of typhus above referred to.

Following is a summary of the work done since active quarantine was instituted:

Persons inspected from Mexico, transient and local	149, 219
Persons inspected from interior of Mexico	7, 642
Persons washed in gasoline	7, 727
Persons vaccinated	2, 552
Pieces of baggage fumigated	4, 022
Persons returned to Mexico because of nondisinfection	5, 683

All freight coming from Mexico was handled by the State health department.

El Paso, *Tex.*—Acting Asst. Surg. John W. Tappan reports that during the year no trains crossed the international line from Mexico, and that therefore the regular train inspection at the El Paso national quarantine was not in effect during this time. Trains from the interior of Mexico, excepting an irregular service from Chihuahua, did not run to the border until January, when a regular schedule from Mexico City was put on and the inward movement of Mexican laborers applying for work in the United States began. Up to this time there had been no typhus in El Paso.

Before the migration of these laborers there was little danger to El Paso from typhus, for Chihuahua was not infected, and the few that were coming into Juarez were comparatively clean and not louse infested. In January a different class of laborers presented for examination, when trains from the interior of Mexico began to run regularly, and the service instituted a thorough inspection for typhus, and for a time it became necessary to return persons infested with lice to Juarez, where they were held for a period of two weeks, cleaned up, and after a rigid inspection, allowed to apply for admission to the United States.

During January a canvass of Juarez was made by an inspector of the Immigration Service and no typhus could be found. The Mexican officials, civil and military, helped in this search, which proved to be fruitless, so far as the discovery of typhus was concerned. This inspector was taken sick with typhus one month after his Juarez investigations for the service, though he had been in Juarez, on duty for the Immigration Service, afterwards. It was impossible in his case to determine whence his infection came. He claimed not to have been louse infested, and no lice were found on his person or clothing when he was taken sick.

On January 13, 1916. N. M., a Mexican laborer, who came from Eagle Pass, Tex., where he crossed into the States clandestinely, was found sick with typhus at the Associated Charities house in El

Paso, and was sent to the county hospital. A service medical officer was called in consultation and the case diagnosed as typhus. This was the first of the 55 El Paso County cases. The man died January 15.

The second case was that of M. B., an immigrant inspector, age 46, white, American; took sick February 18; had been in Juarez and in contact with many Mexicans at the immigration station; died February 27. This was the only case of the 55 not Mexican.

On February 26 a Mexican laborer who had been sick, undoubtedly with typhus, from the history, was found in a shanty on South Oregon Street. He was convalescent when found. From this shanty and its immediate neighborhood 14 cases were subsequently taken.

On March 4, E. L., age 20, a Mexican laborer who lived in the smelter district, near El Paso, was seen when convalescent. Two girls in this family had been sick with the same symptoms about two weeks before—probably typhus. The mother of this family (F. G., age 48) was sick with typhus and was taken to the county hospital, March 4, where she died March 7. From this same family a youth (F. L., age 18) was taken to the hospital, March 4, with fever. He developed a severe case of typhus, but recovered. This family came from Encarnacion, via Aguascalientes, San Luis Potosi, Torreon, and Juarez, staying a few days in each place; said to have arrived in El Paso about January 20. From this family most of the smelter cases are supposed to have become infected.

This was the beginning of the "typhus epidemic" in El Paso. There were 61 cases recorded, of which 55 were local and 6 were imported from outside El Paso County (sent here for treatment in each case by a railway company's section foreman) on trains carrying passengers.

Upon the arrival of Senior Surg. C. C. Pierce, early in March, a consultation of health authorities was held and more strenuous efforts to clean up the Mexican quarter were instituted by the city and county. The results of this activity were apparent, and upon the establishment of the disinfecting plant, supervised by the service, in Juarez, the "epidemic" slowly abated and seems at this writing to be stamped out, so far as El Paso is concerned. This much can be said in favor of the plant in Juarez: The Mexicans who heretofore were coming into the country dirty and louse infested are now coming in clean and free of lice. Those who may be incubating typhus on admission are at least not infested with lice and are not a menace until they become infested again.

During the year 26,244 aliens were examined at the immigration station and 15,008 vaccinations performed. There were 190 certificates rendered in the regular routine of immigration work, a report of which has been made in detail. (See report of medical inspection of immigrants.)

After the establishment of the disinfecting plant in Juarez, all incoming immigrants of the laboring classes were bathed and their clothing and baggage disinfected under the supervision of the service. There were thus treated during the period from March 14 to June 30, 1916, 15,962 persons as follows:

Persons bathed and clothing disinfected (males)	10, 587
Persons bathed and clothing disinfected (females)	5, 375
Additional pieces of baggage disinfected	4, 935

Hidalgo, Tex.—Acting Asst. Surg. W. P. Woodall reports as follows:

Eight thousand two hundred and ninety-six aliens were examined for the immigration authorities and of this number 274 were debarred. Chronic conjunctivitis was found to be the prevailing cause for certification.

With the appearance of smallpox during the winter, traceable to Mexico through the port of Hidalgo, a rigid system of examination and vaccination has been carried out. All nonimmunes and possible contacts have been vaccinated. About 2,000 were thus protected. An epidemic of the disease existed in Rio Bravo, a village in Mexico some 12 miles distant from this port, in consequence of which the local authorities placed a quarantine against all Mexico for about two weeks.

With continued disturbance and disruption in Mexico, inhabitants thereof continued to apply for admission in increasing numbers. Those having had recent residence in the plateau sections of Mexico were found to be almost invariably carriers of bodily vermin, and typhus fever threatened to invade the country.

Senior Surg. Pierce visited the station in February and outlined and directed a plan of action against the threatened disease which has been carried to a successful end. It is believed that no typhus has existed in the lower Rio Grande Valley during the period covered by this report.

Over 1,500 vermin carriers have been subjected to gasoline baths and their clothing and fomites sterilized by the methods adopted by the service.

Laredo, Tex.—Asst. Surg. E. W. Scott reports as follows:

During the fiscal year the United States was threatened with the introduction of typhus fever from Mexico, where a severe epidemic of this disease prevailed for several months. In order to facilitate commerce between these countries, the quarantine procedure, presently to be described, was instituted at this port by Senior Surg. C. C. Pierce, who at that time was in charge of the United States-Mexican border quarantine.

Neither buildings nor appliances for disinfection were available at Laredo, Tex., but at Nuevo Laredo, Mex., was discovered a disinfecting plant which had been erected during a yellow-fever epidemic some years. This consisted of a building of moderate size, a steam sterilizer, and a boiler. After the installation of a few shower baths the necessary disinfection of suspects from Mexico was done at this plant under the joint supervision of the United States and Mexican health authorities.

The disinfection consisted of an application of gasoline to the head, a shower bath, and sterilization of clothing and baggage in the autoclave. The number of persons receiving this treatment was 14,669.

During the greater part of the past fiscal year, by reason of disturbed conditions in Mexico, very few passenger trains crossed the international bridge at this port. Passengers arriving at Nuevo Laredo, Mex., from interior points of Mexico and destined for the United States crossed the international footbridge in the regular routine of traffic between Nuevo Laredo, Mex., and Laredo, Tex.

All persons were inspected at the footbridge. They were required to present evidence of having had smallpox or a recent successful vaccination, or to submit to vaccination before entering the United States; 34,052 persons were vaccinated during the year.

The number of cases of smallpox reported at Laredo, Tex., during the past year was 78. Active measures were taken to prevent the spread of this disease by the city physician. Persons suffering from smallpox were isolated and those exposed were vaccinated.

Seventeen cases of typhus fever occurred at this port among recent arrivals from Mexico. Proper precautions were taken and no secondary cases developed.

Three cases of leprosy were observed during the year, but no official record was made, as the persons afflicted voluntarily returned to Mexico.

Passenger trains from Mexico inspected and passed only numbered 36 because of the Mexican revolution on the border.

Persons on passenger trains inspected for quarantinable diseases numbered 2,318; persons inspected at international foot and carriage bridge for quarantinable diseases, 652,024; making a total of 654,342 inspected at this port for quarantinable diseases.

Persons vaccinated or revaccinated upon entry numbered 34,052; persons given gasoline bath of hairy parts followed by a general bath with water, using soap, and their wearing apparel, baggage, etc., sterilized in a steam autoclave under pressure at Nuevo Laredo, Mexico, under supervision of employees of the service, 14,669, between January 1 and June 17, 1916, when service employees were retained on United States side of the border owing to friction and anti-American feeling in Mexico. The plant continued to work under Mexican employees, but their work was very unsatisfactory and not accepted.

From June 18 to 30, 1916, persons given gasoline bath, followed by water and soap bath, and wearing apparel dipped in gasoline for the destruction of vermin numbered 281. (The State of Texas disinfected the hand or other baggage with sulphur dioxide or hydrocyanic-acid gas, having fitted up a building for that purpose.)

Lepers refused entry at quarantine numbered three. One leper found in city who had entered clandestinely was certified to the immigration authorities and deported.

An epidemic of dengue occurred during the months of October, November, and December, 1915, without any mortality.

The service officers assist local health authorities in making the diagnosis of smallpox, typhus, dengue, etc., and are considered part of the local health board, giving advice and other assistance possible.

Although a great many persons were refused entry for reason of having an abnormal temperature and considered suspicious, as also others with smallpox in the eruptive or contagious stages and the number with lice in the thousands, no record was kept for reason of the limited number of employees.

Nogales, Ariz.—Acting Asst. Surg. A. L. Gustetter reports as follows:

During the past year, owing to the disturbed conditions in Mexico, trains arrived at this station irregularly. Much more time was given by the Mexicans to the matters of revolution than to sanitary conditions, and as a result smallpox was prevalent in almost every city and hamlet of Sonora, Mexico. Hermosillo, Guaymas, and Magdalena, however, had the greater number of smallpox cases. All persons coming from smallpox infested districts were vaccinated unless they presented evidence of recent successful vaccination. On May 30, 1916, one case of typhus fever in Nogales, Mexico, was reported to the Mexican authorities and the bureau also notified thereof by telegram. The Mexican authorities immediately isolated the case and burned all personal effects and clothing of patient. Recovery resulted and no other cases followed.

OPERATIONS OF THE SERVICE IN THE PHILIPPINES.

Surg. J. D. Long, chief quarantine officer, reports as follows:

Service activities in the Philippines may be classed under the following headings: First, quarantine, (*a*) incoming or domestic national, (*b*) outgoing or consular; second, medical inspection of immigrants; third, sanitation of interisland vessels; fourth, physical examination of applicants for marine licenses and other Government positions; and, sixth, miscellaneous duties not included in the above.

There are 10 medical officers of the United States Public Health Service on duty in the Philippine Islands, 5 commissioned and 5 acting assistant surgeons, stationed in the following ports: Manila, Iloilo, Cebu, Zamboanga, Jolo, Cavite, and Olongapo.

For the purposes of detention and treatment of personnel and vessels within the provisions of the quarantine regulations two quarantine stations are maintained, one on Mariveles Bay, about 30 miles from Manila, and one on the island of Cauit, in the harbor of Cebu. The first is the quarantine station for the port of Manila and for the northern part of the archipelago, and the second fulfills a like function for the port of Cebu and the ports in the southern islands.

Quarantine.

(*a*) *Incoming or domestic national.*—On account of the effect of the European war upon shipping there has been a considerable falling off in the number of vessels coming to the ports of the Philippine Islands during the past year, but this condition is gradually improving, and, though the number of vessels is less, trade has been maintained with the usual ports and in certain instances has shown an actual increase. Several new ports have been added to the list.

Through geographical position and commercial relations the Philippine Islands are brought into intimate contact with the various ports throughout the Orient, and as in many of these the various quarantinable diseases exist in endemic or epidemic form, it is necessary to maintain a close surveillance over all shipping coming to the islands.

It has not been found necessary during the past year to establish a special quarantine against any particular port or to institute measures other than the usual routine.

For the purposes of deratization and prevention of the introduction of plague, systematic fumigation of vessels is done as follows: Vessels plying from the Philippines to Japanese and Australian ports and Guam, once every six months; from Philippines to Chinese ports, once every two months; from Philippines to the United States by way of oriental ports, or to Europe by way of Asiatic ports, once every round trip; also all cattle ships and ships engaged in carrying rice from East Indian ports, including Singapore and Saigon, are fumigated once every round trip. The majority of vessels coming to Philippine ports follow a regular schedule, so that periodic fumigations are done, but any others not coming within the above category are treated in accordance with their sanitary histories. The fumigation statistics for the year are as follows:

Fumigations.

Vessels fumigated at Manila	223
Vessels fumigated at Iloilo	278
Vessels fumigated at Cebu	75
Total	576

Rodents destroyed.

	Manila.	Cebu.	Iloilo.
Number of rats	963	348	97
Number of mice	217	247	34

At present all fumigations are done with sulphur, but in view of the fact that it can not in the majority of instances be used on vessels with cargoes it is intended to replace this fumigant with the cyanide process which, judging from experience elsewhere, is applicable to vessels loaded or unloaded and gives much more satisfactory results as concern penetration and lethal activity. In this connection it may be stated that a study of the conditions under which vessels are loaded and discharged in certain eastern ports having large trade relations with the Philippines would appear to indicate that such rodent migration as may take place is almost solely through the medium of cargoes. The relative importance of this channel of possible plague introduction is still open to proof and it is with the idea of determining as far as possible what part it may play that a systematic examination of samples of all classes of cargoes from foreign ports has recently been inaugurated at the port of Manila. The necessity for the rat proofing of cargoes should be demonstrated before this expense is required to be added to shipping costs, and experience here would seem to indicate that, given the cargo-handling methods employed at the ports in question and the enforced periodic fumigations of vessels, such necessary rat proofing will have a limited range of practical efficiency.

In addition to fumigation regulations, all vessels coming to Philippine ports are required to use rat guards on lines and to fend off at least 6 feet alongside piers or wharves.

As Manila is the largest shipping port in the islands and continually has ships in her harbor from all sections of the world, a patrol of the harbor is made twice daily for the purpose of inspecting piers to determine if the antiplague provisions are being carried out, and to see that the regulations against the throwing of garbage and other refuse into the harbor, on piers, or along the water front are being observed.

The status of cholera in ports having trade relations with the Philippines has not been such during the past year as to require the enforcement of regulations other than those of the usual quarantine procedure, however, as an additional precaution, in conjunction with the examination of arriving aliens for hookworm and other intestinal parasites, an examination is also made to determine the presence or absence of cholera. Any cholera carriers thus found are removed and isolated and if deemed necessary, the ship is treated in the routine manner. Two such carriers were found during the past year, both from Japan.

The practice throughout the Orient of using human feces for fertilizing purposes has necessitated the continuance of the prohibition of the importation of fresh vegetables. However, it is expected that arrangements will be made with Japanese shippers whereby fresh vegetables may be admitted, satisfactory evidence to be furnished that such shipments have the Japanese Government's certification as to proper methods of cultivation.

All steerage and second-class passengers arriving at Philippine ports who do not present satisfactory evidence of vaccination before embarkation, are required to be vaccinated before landing in the islands. During the past year 8,607 vaccinations of this class were made. All crews of interisland craft are required to be vaccinated before employment. Four cases of smallpox were found at time of arrival on incoming vessels from foreign ports during the year. Personnel and vessels were treated in the usual manner prescribed by the quarantine regulations.

No cases of typhus were found on incoming vessels nor were any special regulations against typhus enforced during the year.

Although relations between the Philippines and ports where yellow fever exists are not intimate, the presence of the *Ædes calopus* throughout the islands renders possible the spread of yellow fever should it at any time be introduced. The opening of the Panama Canal has brought the Philippines into much closer relation with the yellow-fever zone, and though the probability of the introduction of the disease may be slight, the possibility exists and as a precaution against such introduction the fumigation of all vessels arriving from the canal is done as a routine measure for the destruction of mosquitoes.

Although measles is not a quarantinable disease under the regulations, experience has demonstrated that the introduction of new infection produces a type of this disease having a greater severity and mortality than the type endemic in the islands. In cooperation with the Philippine health service, therefore, a careful inspection is always made for cases on vessels, so that if found they may be properly isolated. During the past year 32 were found on vessels from foreign ports.

As diphtheria is not widespread nor severe in the Philippines, the exclusion of this disease is also attempted by a careful inspection and taking of throat cultures on such vessels as necessary. In this connection it may be stated that on one vessel alone 1 case and 27 carriers were thus discovered, which if allowed to land without proper supervision and isolation may have produced a serious epidemic of the disease.

The incoming national quarantine transactions may be tabulated as follows:

MANILA.

Vessels inspected from United States ports	84
Vessels inspected from foreign ports	493
Vessels disinfected on account of disease	20
Vessels in quarantine	2
Vessels fumigated to destroy rats, fleas, etc	223
Crew inspected on arriving vessels	44,917
Cabin passengers inspected on arriving vessels	11,303
Steerage passengers inspected on arriving vessels	20,538
Persons detained in quarantine under observation	142
Persons vaccinated at quarantine	9,273
Meat certificates viseéd	3,432
Stool examinations made for hookworm of arrivals	739
Cases of smallpox on arriving vessels	1
Cases of diphtheria and diphtheria carriers arrived	28

MARIVELES.

Vessels at station for treatment	15
Vessels disinfected and fumigated	10
Persons bathed and effects disinfected	2,102
Pieces of baggage disinfected	2,981
Persons vaccinated	1,183
Persons held in quarantine	27
Crew and passengers inspected	2,699
Persons treated in hospital and dispensary	677

CAVITE.

Vessels inspected on arrival	8
Crew inspected on arriving vessels	780
Passengers inspected on arriving vessels	2

OLONGAPO.

Vessels inspected on arrival	2
Crew inspected on arriving vessels	403
Passengers inspected on arriving vessels	4

ILOILO.

Vessels inspected on arrival	75
Vessels disinfected or fumigated	278
Vessels in quarantine	2
Crew inspected on arriving vessels	3,752
Cabin passengers inspected on arriving vessels	486
Steerage passengers inspected on arriving vessels	322
Persons vaccinated upon arrival	38

CEBU.

Vessels inspected from United States ports	11
Vessels inspected from foreign ports	111
Vessels disinfected or fumigated	76
Vessels in quarantine	1
Cases of smallpox arrived at quarantine	1
Persons detained in quarantine under observation	38
Crew inspected on arriving vessels	6,757
Cabin passengers inspected on arriving vessels	350
Steerage passengers inspected on arriving vessels	681

ZAMBOANGA.

Vessels inspected upon arrival	32
Crew inspected upon arriving vessels	1,873
Cabin passengers inspected upon arriving vessels	455
Steerage passengers inspected upon arriving vessels	350

JOLO.

Vessels inspected upon arrival	41
Crew inspected upon arriving vessels	2, 690
Cabin passengers inspected upon arriving vessels	147
Steerage passengers inspected upon arriving vessels	620

Port.	Steamers inspected.	Sail vessels inspected.	Total vessels inspected.	Vessels quarantined.	Vessels fumigated and disinfected.	Total passengers and crew inspected
Manila	695	4	699	2	245	76,758
Cavite	8	....	8	....	....	780
Olongapo	2	....	2	....	....	407
Iloilo	196	1	197	1	278	4,560
Cebu	118	....	118	1	76	7,788
Zamboanga	32	....	32	....	....	2,578
Jolo	41	....	41	....	....	3,457

(*b*) *Consular quarantine.*—Under the quarantine regulations, ports in the Philippines are considered for administrative purposes as foreign ports, and all vessels for American ports are required to obtain consular bills of health and to comply with the regulations which are imposed on vessels at foreign ports of departure when sailing for United States ports. This comprises inspection and fumigation of vessels, inspection of crews and passengers, and inspection and certification of cargo. Transactions for the year may be tabulated as follows:

Bills of health issued	477
Vessels inspected	171
Vessels disinfected and fumigated	47
Crew inspected	24, 328
Passengers inspected	18, 066
Pieces cargo inspected and certified	2, 574, 537

MEDICAL INSPETION OF IMMIGRANTS.

In connection with other duties service officers have conducted the medical inspections of all aliens arriving at ports in the Philippines, in accordance with the United States immigration laws. In so far as laboratory facilities allow, an examination of steerage passengers was made for cholera, hookworm, and other intestinal parasites. As heretofore, the great majority of specimens do not show infection. It is the general practice of steamship companies to require certificates from steerage passengers before the purchase of tickets, showing that they have been examined at port of departure for hookworm and found negative. The immigration work for the past year may be tabulated as follows:

Port.	Aliens inspected.	Aliens rejected.
Manila	3,188	3
Cebu	192	48
Iloilo	257	....
Jolo	308	2
Zamboanga	179	4

SANITATION OF INTERISLAND VESSELS.

For the purpose of maintaining a proper sanitary standard on all interisland vessels and to prevent the interisland spread of cholera, plague, or other quarantinable diseases, periodic inspections of all interisland vessels and local craft are made. All vessels engaged in interisland traffic were fumigated at least once every six months, and also vessels engaged in harbor work, such as launches, lighters, cascos, etc., were given periodical fumigations. Reports of the sanitary condition of all interisland vessels are made to the chief quarantine officer, and infractions of rules are punishable by fine under local port regulations, so that a general improvement in the sanitation of vessels is constantly noticeable. During the year 950 inspections of this class were made.

One of the important pieces of work which has been carried out by the service during the past year was the cholera-carrier survey which was made in order to determine the probable presence of cholera carriers among the crews of the cascos, lighters, and other small craft used in loading and discharging vessels in Manila Bay, and aboard interisland steamers as well. During a time when cholera was not present in Manila, a survey was made in August and September, 1915, with the result that out of 1,117 persons examined, 1 cholera carrier was found, thus demonstrating that although no cholera had occurred in Manila for a month, yet there were cholera carriers to be found among the otherwise seemingly healthy population. The work was started on August 3 and concluded on September 17. The aim was to obtain 1,000 specimens from an average vessel population. The four hundred and seventy-first specimen taken was postive for cholera vibrios, and occurred in the member of the crew of a casco. Specimens were taken as follows:

Vessels.	Number.	Persons examined.
Cascos	47	388
Barges	21	102
Lighters	23	152
Launches	28	229
Steamers	7	246
Total	126	1,117

On January 22 a second survey was started and is still being continued at the present time. Under this survey specimens were taken as follows:

Vessels surveyed.

Interisland steamers	64
Interisland sail vessels	43
Barges	127
Lighters	97
Launches	73
Rowboats	18
Cascos	195
Total	617

Specimens taken.

Month.	Number.	Positive cholera carriers.
January	255	
February	1,025	2
March	905	
April	1,095	1
May	1,881	7
June	600	
Total	5,761	10

During the past year two cases of cholera were found on interisland vessels, after the latter had left Manila for interisland ports. Both ships were remanded to Mariveles quarantine station and given the usual treatment. All persons were held on board until examination of stool specimens showed the absence of cholera carriers.

PHYSICAL EXAMINATION OF APPLICANTS FOR MARINE LICENSES AND OTHER GOVERNMENT POSITIONS.

Examinations made during the year.

	Deck officers.	Engineer officers.	Total.
Manila	172	223	295
Iloilo	14	15	29
Cebu	43	64	107
Grand total			431

MISCELLANEOUS DUTIES NOT INCLUDED IN THE FORGOING.

During the past year aid was extended to Philippine government bureaus, the various United States services, and to consular services of other Governments in Manila. The character of same may be briefly outlined as follows: Bureau of agriculture, disinfection of vessels possibly infected with cattle diseases, and supervision of arriving cargoes and hides. Bureau of customs, physical examination of officers applying for licenses in the Philippine marine service, dispensary service for injured employees, medical inspection of and medical service for arriving and detained immigrants. Philippine health service, sanitary supervision of interisland craft, disinfection of leper-carrying vessels, furnishing of water transportation at the various ports of entry and assistance by service officers to various medical stations of the Philippine health service. Board of food and drug inspection, viséing meat inspection certificates of meat shipments and meat products from foreign countries. Nautical School, physical examination of applicants. Foreign consular service, furnishing of sanitary data and bills of health. Weather Bureau, displaying of typhoon signals. Lighthouse Establishment, maintenance of a light in the vicinity of the Mariveles quarantine station. Bureau of constabulary, medical treatment by service officers. Various other services were rendered to the Army, Navy, Coast and Geodetic Survey, and other insular bureaus.

GENERAL APPROPRIATIONS.

The change in the fiscal-year appropriations from a year ending June 30 to a year ending December 31 causes the financial transactions during the fiscal year under report to include funds of two annual appropriations. There was on hand July 1, 1915, a balance of $27,391.25 of funds appropriated for the calendar year 1915 in Act 2345. The legislature for the calendar year 1916 appropriated for the maintenance and operations of the bureau of quarantine service in the Philippine Islands the sum of $57,416.50, divided into salaries and wages $44,336.50, contingent expenses $12,180, fixed assets $900. This appropriation carried an increase of $2,131.50 over the appropriation for the preceding year to cover the general increase in the cost of supplies, or not quite 10 per cent, while the actual average increase has been over 30 per cent. Under the circumstances the appropriation was another reduction from the amounts appropriated in former years. There was expended for all purposes from general funds the sum of $51,727.75, and at the close of the Philippine fiscal year, December 31, 1916, the sum of $1,968.96 was reverted to the treasury. There are outstanding obligations June 30, 1916, amounting to $2,413.94.

FUNDS FOR PUBLIC WORKS AND PERMANENT IMPROVEMENTS.

There was carried forward from the fiscal year ending June 30, 1915, unexpended balances in three public works funds. There was a small balance, as will be seen by reference to the financial statement, in the fund for the construction of barracks at Mariveles, the erection of a disinfecting building at the Cebu quarantine station, and in the fund appropriated in Act 2494 for making routine repairs to buildings at the several quarantine stations. These funds totaled $1,510.21, and during the year the entire balance in each of the three funds was expended in completing the projects for which the money was appropriated, or a total expenditure of $1,510.21 for public works and permanent improvements. At the close of the fiscal year there are no funds of any kind on hand for public works and repairs. However, a small fund may be available for repairs to building from savings in the $3,400 appropriated in the general appropriation bill for "Repair and maintenance service."

Financial statement, Philippine quarantine service.

GENERAL CURRENT APPROPRIATION.

Appropriation, Act 2431, balance on hand July 1, 1915	$27, 391. 25
Appropriation, Act 2540, allotment of 6 months	28, 708. 25
Accounts payable prior fiscal years	11. 15
Total	56, 110. 65
Expended during fiscal year ended June 30, 1916	51, 727. 75
Reverted to treasury Dec. 31, 1915	1, 968. 96
Unexpended balance June 30, 1916	2, 413. 94
Total	56, 110. 65

Outstanding obligations June 30. 1916	2,413.94
Collections during fiscal year:	
Available for expenditure	45.50
Not available for expenditure	486.13

PUBLIC WORKS AND PERMANENT IMPROVEMENTS FUNDS.

Funds:	
Barracks, Mariveles, balance	61.08
Disinfection building, Cebu, balance	80.33
Repairs, buildings, Act 2494	1,368.80
Total	1,510.21
Expended:	
Barracks, Mariveles	61.08
Disinfection building	80.33
Repairs, buildings, Act 2494	1,368.80
Total	1,510.21

COMBINED EXPENDITURES.

From general funds, current appropriations	51,727.75
From public works funds, special appropriations	1,510.21
Total	53,237.96

Expenditures by station.

MANILA.		
General service expenses	$18,689.77	
Launch expenses	5,268.65	
New station equipment	679.27	
		$24,637.69
MARIVELES.		
General service expenses	9,855.34	
Repairs to building and wharves	2,108.99	
Launch expenses	813.42	
New construction and equipment	534.64	
		13,312.39
ILOILO.		
General service expenses	2,469.79	
Launch and barge expenses	3,215.32	
New station equipment	5.34	
		5,690.45
CEBU.		
General service expenses	4,541.57	
Launch expenses	3,311.20	
Repairs buildings and wharves	729.43	
New construction and equipment	280.23	
		8,862.43
ZAMBOANGA.		
General service expenses		307.50
JOLO.		
General service expenses		427.50
Total		53,237.96

OPERATIONS OF THE SERVICE IN PORTO RICO.

Service operations in Porto Rico for the fiscal year embraced, as in the previous year, quarantine, marine-hospital relief, medical inspection of immigrants and miscellaneous duties.

The service maintains quarantine stations at San Juan, Ponce, Mayaguez, Arecibo, Aguadilla, Fajardo, Humacao, Arroyo, Guanica, and Jobos (Aguirre). Immigrations inspection is done at all these ports, but marine-hospital relief is furnished only at San Juan and Ponce.

Quarantine is the most important phase of the service operations in Porto Rico. The medical officer in charge at San Juan is chief quarantine officer for Porto Rico and has under his supervision and direction all quarantine matters at the other ports. At San Juan is maintained the only quarantine station in Porto Rico, located on Miraflores Island, in San Juan Bay. It is equipped with quarters for noncommissioned officers and attendants, detention quarters, disinfecting and fumigating apparatus, etc. The office is located in San Juan, in the old naval station, occupying a commodius building belonging to the service. Here are located also the out-patient dispensary and a small station laboratory.

Summary of transactions.

San Juan:	
Steam vessels inspected	261
Sailing vessels inspected	81
Vessels held in quarantine	38
Vessels fumigated	50
Net tonnage of vessels fumigated	30, 805
Sulphur consumed, pounds	12, 532
Rodents recovered after fumigation	138
Packages of cargo fumigated to kill rats	58, 748
Crew inspected	17, 409
Passengers inspected, incoming	5, 034
Passengers inspected, transit	15, 207
Passengers detained for observation	482
Total number of days passengers in quarantine	1, 668
Cases of sickness (nonquarantinable) occurring among passengers in quarantine	8
Number of vessels arriving with quarantinable disease on board (smallpox)	6
Number of cases of smallpox on above vessels	[1] 7
Bills of health issued	295
Immigrants inspected	3, 021
Immigrants certified	30
Certified immigrants landed	[2] 20
Certified immigrants deported	8
Certified immigrants held pending disposition	3
Ponce:	
Steam vessels inspected	84
Sailing vessels inspected	32
Vessels held in quarantine	16
Vessels fumigated	3
Packages of cargo fumigated to kill rats	4, 305
Crew inspected	5, 482
Passengers inspected, incoming	289
Passengers inspected, transit	7, 450
Bills of health issued	88
Immigrants inspected	120
Immigrants certified	4
Certified immigrants landed	None.
Certified immigrants deported	4
Service patients treated in hospital	10
Days relief furnished	100
Service patients treated at out-patient office	28
Times relief furnished	54

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[1] One patient died and was buried at sea before arrival. One patient died at quarantine station.

[2] One immigrant was brought forward from previous year.

Mayaguez:	
Steam vessels inspected	97
Sailing vessels inspected	55
Vessels held in quarantine	26
Packages of cargo fumigated to kill rats	684
Crew inspected	5, 363
Passengers inspected, incoming	593
Passengers inspected, transit	2, 603
Bills of health issued	40
Immigrants inspected	62
Immigrants certified	None.
Arecibo:	
Bills of health issued	6
Aguadilla:	
Sailing vessels inspected	1
Crew inspected	9
Bills of health issued	8
Fajardo:	
Sailing vessels inspected	44
Crew inspected	191
Passengers inspected, incoming	77
Passengers inspected, transit	9
Bills of health issued	47
Immigrants inspected	62
Immigrants certified	None.
Humacao:	
Sailing vessels inspected	13
Crew inspected	106
Passengers inspected, incoming	6
Passengers inspected, transit	None.
Bills of health issued	23
Immigrants inspected	1
Immigrants certified	None.
Arroyo:	
Sailing vessels inspected	1
Crew inspected	4
Bills of health issued	5
Guanica:	
Steam vessels inspected	165
Crew inspected	7, 342
Passengers inspected, incoming	811
Immigrants inspected	199
Immigrants certified	2
Certified immigrants landed	1
Certified immigrants deported	1
Jobos (Aguirre):	
Steam vessels inspected	1
Vessels held in quarantine	1
Crew inspected	33
Bills of health issued	14

Special yellow-fever measures.—The ports of Venezuela being considered endemic centers of yellow fever, vessels from these ports en route to the United States and Spain are held in quarantine, but during their short stay in Porto Rico are allowed to transact business under certain restrictions while anchored in the bay. Nonimmune passengers who can not show evidence of having left such ports six days before arrival in Porto Rico are detained in quarantine to complete the six-day period.

On rare occasions there are vessels from infected or suspected ports of Trinidad, Brazil, etc., which are treated in similar manner.

Outgoing plague quarantine.—After the eradication of plague in Porto Rico, the outgoing quarantine restrictions were modified on different occasions until at present the measures are fumigation of vessels for the destruction of rats every six months, and the use of rat guards on the lines when vessels are moored alongside piers.

Bills of health.—Bills of health are issued by service officers at Porto Rican ports to all vessels destined to ports in the United States.

Fumigation of vessels.—Under the provision of bureau circular of August 4, 1913, vessels from certain ports have been fumigated before being allowed to dock. They are mostly small sailing vessels from West Indian ports. Sulphur is usually used but lately hydrocyanic gas has been satisfactorily substituted in several special instances.

Other vessels from ports included in the provisions of a circular which make Porto Rican ports only as ports of call are prohibited from docking but are allowed to transact business while at anchor in the bay, provided precautions are taken to prevent rats being carried ashore.

Vessels coming within the requirements of fumigation at six-month intervals are fumigated at San Juan or at the United States port, as may be convenient.

Fumigation of cargo.—The fumigation of cargo for rats, which was put into force during 1913, has been continued. At San Juan hydrocyanic gas is used; at Ponce and Mayaguez, sulphur dioxide gas.

The method of fumigating this cargo at San Juan has been the cause of constant complaint by the importers, and various changes have been considered to improve the methods in use. The system of handling this class of freight has been to lighter it to the old customhouse bulkhead from where it was trucked to a small warehouse, a distance of 60 yards. During the day the packages of vegetables were stacked in this building, and the fumigation was practiced at night. With large shipments, there have been times when several successive days and nights were required to dispatch the entire shipment.

Under that system, there were several objectionable features; danger of rats escaping from the packages during handling, expense, damage, and delay of goods on the part of the importer, night work by the service officers and employees, waste of material in fumigating the entire building to treat a small shipment, etc.

Under the new system the freight is loaded into the lighters alongside the steamer, in a manner permitting free circulation of the gas, and are anchored offshore where the hydrocyanic gas is applied under tarpaulins which are firmly battened to prevent leakage. Control animals in cages have demonstrated the efficiency of the method and practically all the objections to the former method have been removed. The largest shipments can be dispatched in a few hours and importers have expresed themselves as well pleased with the improvement.

QUARANTINABLE DISEASES.

Yellow fever.—About the 1st of October, 1915, the surgeon of the military post reported a number of cases as yellow fever and stated that he believed it was epidemic in San Juan. The cases were investigated by the sanitation service of Porto Rico and by officers of the United States Public Health Service, and it was found that the alleged yellow fever was chiefly dengue, but also included a number of various other diseases. A detailed report with histories of these cases was made to the bureau, dated December 8, 1915.

The persistence of the Army surgeon in his opinion and the unusual prevalence of fever cases (dengue) in the city, kept the reports of yellow fever alive until a final investigation was made by Surg. Gen. Gorgas, United States Army, and Asst. Surg. Gen Carter, United States Public Health Service, who were unable to find yellow fever.

Smallpox.—Official announcement was made on May 4, 1916, of the occurrence of smallpox at San Juan, and this announcement was soon followed by reports of its presence at numerous other places in Porto Rico. Up to July 2, 1916, a total of 556 cases and 3 deaths have been reported from 28 municipalities. San Juan with 270 cases and 1 death has been the chief center.

The disease had evidently been spreading for sufficient time to get a good start before discovery, and this failure to recognize the early cases was probably due to the widespread prevalence of true chicken pox for several months before the recognition of smallpox. The chicken-pox cases continue to occur and are frequently the cause of some errors of diagnosis.

Immediately following the announcement of smallpox energetic repressive measures were instituted by the sanitation service of Porto Rico. Isolation of the patients, disinfection of infected habitations, and general vaccination have been the principal methods of fighting the disease, with the result that the epidemic has been rapidly brought under control, although sporadic cases are still occurring.

Upon notification that vaccination certificates would be required of all passengers and crew going from Porto Rico to the United States, this office, before issuing the bill of health to the vessel, checked up and stamped the vaccination certificates in order to enforce this requirement.

This office also undertook the general vaccination of seamen of coasting vessels around Porto Rico, as well as those of vessels going to the United States ports. Up to the close of the fiscal year 1,275 vaccinations were performed.

The origin of the epidemic has been the subject of some discussion and the statement was made in a local newspaper that it had been imported. That it was a fresh importation is highly improbable, and on the other hand it is far more probable that it was a recrudescence of the disease already existing in Porto Rico. This question was discussed in detail in a report upon the smallpox epidemic from this office to the bureau, dated June 23, 1916, and it was shown that smallpox has been reported in Porto Rico almost every year since the American occupation.

Leprosy.—Leprosy is endemic in Porto Rico, but the cases are not very numerous. Lepers are isolated on Cabras Island, at the entrance of San Juan Bay, as soon as the diagnosis is positively made. At present there are 36 patients so segregated.

PLAGUE ERADICATION.

No human or rodent plague has been reported in Porto Rico during the year.

The laboratory examination of rodents has been continued by the sanitation service of the insular government. The weekly statements from July 3, 1915, to June 30, 1916, show 11,765 rats, 866 mice, and

5 mongoose examined, with negative results. The majority of these rodents were caught in San Juan and the suburbs of Puerta de Tierra and Santurce.

OTHER OPERATIONS.

Other operations at this port have been routine matters, such as marine-hospital relief, medical inspection of seamen, medical inspection of aliens, etc., which are given in the statistical tables under their proper headings.

Surg. W. W. King, in addition to his duties as chief quarantine officer, has continued a member of the Institute of Tropical Medicine nd Hygiene of Porto Rico, organized for the study of diseases peculiar to that country and climate.

OPERATIONS OF THE SERVICE IN HAWAII.

The activities of the United States Public Health Service, under direction of the chief quarantine officer, in the Hawaiian Islands remained the same as for previous years and were divided as follows:

1. National quarantine.
2. Marine-hospital relief.
3. Medical inspection of immigrants.
4. Plague laboratory.

GENERAL.

Medical officers of the service are stationed at the seven ports of entry in the Hawaiian Islands, namely, Honolulu, Hilo, Kahului, Lahaina, Makaweli, Mahukona, and Koloa.

The only complete disinfection and detention station is located at the port of Honolulu. Sufficient equipment for the fumigation of vessels for mosquitoes and rodent eradication is maintained at the ports of Hilo and Kahului, while the remaining four ports are simply inspection stations, any infected vessels arriving being remanded to the Honolulu station for treatment.

Though the quarantinable diseases were present at the ports of departure in the Philippines, China, Japan, and the west coast of South America of vessels bound for the Hawaiian Islands, only three vessels arrived at Honolulu during the year with histories of having had quarantinable diseases on board during the voyage. One case of smallpox was discovered on a transport just before departure from Manila, while leprosy was present on two vessels arriving from Pacific coast ports.

Vessels inspected.—Six hundred and twenty-three vessels were boarded and inspected upon arrival at the following ports of entry, namely: Honolulu, 552; Hilo, 31; Kahului, 19; Mahukona, 5; Makaweli, 14; Lahaina, 1; and Koloa, 1.

Port sanitary statements.—Five hundred and fifty-eight statements were issued at Honolulu, 110 at Hilo, 87 at Kahului, 12 at Mahukona, 26 at Makaweli, 2 at Lahaina, and 1 at Koloa to vessels bound for United States and foreign ports.

Canal Zone bills of health.—Fourteen were issued at Honolulu and 11 at Hilo to vessels bound for the Panama Canal.

The transactions for the year in the Hawaiian Islands may be tabulated as follows:

	Honolulu.	Hilo.	Kahului.	Mahukona.	Makaweli.	Koloa.	Lahaina.	Total.
Vessels inspected	552	31	19	5	14	1	1	623
Vessels disinfected and fumigated	150	61	3					214
Bills of health issued	572	121	87	12	26	1	2	821
Crews inspected	52,781	1,998	387	63	164	9	10	55,412
Passengers inspected	69,135	2,522	1	1	4	3	2	71,668

DAILY RAT-GUARD INSPECTION.

The instructions contained in department circular letter of June 10, 1912, regarding rat-guard precautions to be taken by vessels while in port were strictly enforced during the year. A daily inspection was made of all vessels in port to see that these requirements were carried out, and only in a few instances was antagonism encountered against complying with the antirat measures.

In addition to the daily inspection of vessels by an employee of the quarantine service, the cooperation of the customs service was obtained and the customs officers on watch on docks promptly reported any violations of the antirat precautions by vessels. In this way an accurate watch is kept on a vessel, both by day and night, and the masters as well as the agents have come to realize that a clean bill of health can only be obtained by strictly complying with the requirements.

PANAMA CANAL.

The opening of the Panama Canal has added considerable work to the quarantine service at Honolulu, both in connection with vessels arriving which have used the canal and vessels departing which will pass through the canal to the ultimate port of destination.

During the year 65 vessels arrived from the canal, while 14 departed for New York via the canal. In view of the fact that none of the vessels which arrived had touched at any port in Central America, except the ports of the Canal Zone, it was not deemed necessary to detain and fumigate them for mosquitoes.

QUARANTINE STATIONS.

Honolulu.—The shear gates of the sewage system, installed in 1914, failing to give satisfaction, were replaced at the expense of the contractor by gates of heavy brass and in three instances by cast-iron gates, it being impracticable to install the brass gates in these three positions.

The runway, supporting the railway track and car, for the disposal of garbage and which extended from the sea wall to a deep hole near the reef, was unsafe, due to damage of the supporting piles by teredos.

This runway is now in course of repairs and rebuilding; the piles will be placed on concrete piers, while all the trusses and stringers will be renewed and painted. This work is being done under contract, at a cost of $675.

In addition to the above, the following repairs and improvements were made at the station: A new French range and steel stack was installed in the station kitchen for the sum of $210; a new 25-horsepower steam boiler was erected in the laundry for the sum of $400, in place of a boiler that had become unserviceable; the local telephone system on the island was overhauled and repaired, and one new telephone installed for the sum of $40; the disinfecting machinery on the wharf was overhauled, repaired, and painted; 1,500 feet of fresh-water pipe, extending from the city across the mud flats to the station, was exposed and given a coating of hot tar; the 2,500 feet of railroad track, extending from the station to the wharf, was scaled and cleaned of rust and given a coating of hot tar, while the roads were repaired and given a dressing of rough coral sand.

WHARF.

Honolulu is the only port in the islands possessing a wharf for the berthing of infected vessels and the necessary equipment and detention facilities for handling their cargoes and personnel.

There is 35 feet of water in front of the wharf and any vessel that can enter the port is capable of being berthed at the dock.

The condition of the wharf and buildings is good, except a small portion of the southeastern end which has fallen in. The dredging around the wharf, which was done several years ago, went below the bottom of the concrete cylinders, thus allowing the teredos to attack the central wooden core pile, and when this was honeycombed the concrete cylinders toppled over.

Twenty-two thousand dollars were appropriated last year for the removal of the present wharf and its reerection in a new site, behind the harbor lines, in order to clear the harbor proper of all obstructions.

Bids were obtained for accomplishing this purpose, but on account of the high price of material and the scarcity of bottoms all the proposals received were in excess of the amount allowed.

The United States district engineer has sufficient funds on hand and has obtained a very reasonable bid for dredging that part of the harbor where the wharf now stands and the reef immediately behind the wharf, as far back as the harbor line, to a depth of 35 feet, but no work can be undertaken until the removal of the wharf is definitely determined upon.

FLOATING EQUIPMENT.

The gasoline boarding launch *Pelican* has been in continuous service throughout the year for conveying the boarding officers to incoming vessels and has rendered very satisfactory and efficient service.

The launch was once dry-docked for the cleaning of the hull and examination of the copper sheathing. It was necessary to renew the armature of the dynamo and to furnish a few supplies, the total cost of all repairs and supplies for the launch during the year amounting to the sum of $37.95.

The steam launch *Oahu* was in commission only for a couple of weeks, during the period that the *Pelican* was laid up for repairs and painting.

The engine, boiler, coal bunkers, and water tanks on the *Oahu* are in exceedingly bad condition, and as they are not worth renewing recommendations have been made for the installation of a gas engine in the hull. The *Oahu* could then be used as a relief boat for the *Pelican*, as well as for service between quarantine wharf and the city.

The small motor launch as well as the whaleboat and small Whitehall boat have been repaired and painted and are in good condition.

VESSELS ARRIVING, ETC.

Smallpox.—The transport *Logan* arrived November 5, 1915, with the history of having had a case of smallpox on board at Manila. The case occurred in the person of a returning soldier and was detected just before the vessel's departure from Manila.

As the necessary precautions had been taken and as there had been no further cases, the vessel was granted pratique upon arrival at this port.

Leprosy.—The steamships *Siberia* and *Hilonian* arrived during the year with cases of leprosy on board. In the case of the *Siberia* the afflicted person was being deported from San Francisco to Manila, while the case on the *Hilonian*, a native of Hawaii was returning for the purpose of entering the Molokai station.

The necessary precautions were taken in both cases as required by the regulations.

VESSELS ARRIVING WITH CONTAGIOUS BUT NONQUARANTINABLE DISEASES ON BOARD.

Many cases of measles, scarlet fever, diphtheria, and a few of malaria arrived on vessels during the year and were reported to the board of health in sufficient time for the necessary measures to be taken in each case.

TYPHOID FEVER ON VESSELS.

Typhoid fever occurred on two vessels during the year, there being one case on a steamer of the Oceanic Steamship Co., and seven on a steamer of the Matson Navigation Co. The first case of typhoid occurred on the last-named vessel in July, 1914, a saloon waiter being affected. Since then there have been nine cases on this vessel, of which six have been among the crew and three in passengers.

Numerous examinations, both at Honolulu and San Francisco, have been made of the crew employed in the handling of food, and always with negative findings.

CHOLERA CARRIERS.

The examination of all steerage passengers from Manila, consisting almost entirely of Filipino laborers and their families being brought into the Territory by the Hawaiian Sugar Planters' Association, for cholera carriers was made at Manila prior to their being furnished transportation.

During the year 12 cholera carriers were found among those presenting themselves for examination, while 1,723 men, 133 women, and 112 children, a total of 1,918, were found free of infection and allowed to embark for Honolulu.

PLAGUE IN HAWAII.

During the year plague prevailed only on the island of Hawaii. Here the infection has been present for the past 16 years, and, as in previous years, the disease remained localized to the Hamakua district.

Four cases of human plague occurred, the first case being reported October 29, 1915, and the last case on December 16, while 15 plague-infected rats were found, 7 being obtained in November, 5 in December, and 3 in January.

The last previous case of human plague on the Hamakua coast occurred on August 16, 1914, and the last previous plague-infected rat was reported on August 29, 1914. There thus elapsed a period of 14 months without the occurrence of either human or rodent plague in this district.

The large number of plague-infected rats obtained was largely due, it is thought, to the exceedingly heavy rainfall on the coast in the fall and winter, which rendered their nesting places untenable in the cane fields, gulches, and stone fences, which particularly abound in that section, and forced the rats to seek shelter in the barns and other buildings of the plantations.

The plague work on the island of Hawaii, under direction of Chief Sanitary Inspector D. S. Bowman, has been thorough and complete and is well shown by the number of rodents obtained as well as the excellent sanitary condition of the plantation camps.

Further information regarding the plague work on Hawaii by the board of health will be found under statistics at the end of the report.

FUMIGATION OF VESSELS FOR MOSQUITOES.

The fumigation of vessels arriving from South and Central American and Mexican ports for the eradication of mosquitoes was continued throughout the year, a total of 27 vessels being so treated, of which 5 were vessels of the Toyo Kisen Kaisha Steamship Co., while the remainder were tramp steamers with cargoes of nitrate, either for the islands or destined for Vladivostok.

FUMIGATION OF VESSELS.

All vessels engaged in the interisland trade were fumigated at regular intervals throughout the year in order to keep them rat free and thus minimize the transmission of plague by these vessels as well as to keep them as clean as possible of vermin and insects, for the benefit of the traveling public. Work of this character was done at the ports of Hilo and Honolulu, as shown by the following table:

Vessels fumigated at Honolulu	124
Vessels fumigated at Hilo	61

VESSELS FUMIGATED FOR RAT QUARANTINE.

Every endeavor has been made to render all vessels calling at ports in the islands as free as possible of animals which might be capable of transmitting disease. All vessels engaged in the interisland trade were fumigated at regular intervals throughout the year, those touching at ports on the island of Hawaii, where plague prevailed, being fumigated every month, while those vessels touching ports on the other islands were treated every three months. All rats that were obtained from fumigated vessels were sent to the plague laboratory for examination to determine whether or not they were plague infected. No infected rats were found during the year.

The vessels fumigated for the purpose of rat eradication were classified as follows:

1. Vessels from foreign ports.
2. Vessels bound for United States ports.
3. Vessels engaged in interisland trade.

1. Vessels from foreign ports.—Fifteen vessels from foreign ports were fumigated during the year with a resulting yield of 180 rats, which is a decrease of 4 vessels and 56 rats as compared with the report of the previous year.

The regular trans-Pacific liners and those plying between the islands and New York, a total of 23 vessels, were fumigated, either at Hongkong, San Francisco, or New York, with a resulting rat yield of 1,273 rats, while 573 were trapped by the crew of these vessels during the year.

The trans-Pacific liners, and in particular those touching at Chinese and Japanese ports, continued to yield a large number of rats at each fumigation, while the number of rats trapped by the crew on these vessels was truly surprising, and apparently shows that rapid rodent infestation takes place in some manner.

These vessels discharge and load cargo at a dock only at the ports of San Francisco, Honolulu, Manila, and occasionally at Yokohama, while they are frequently dry docked at the port of Hongkong.

At the ports of Yokohama, Kobe, Nagasaki, Shanghai, and Hongkong all cargo is discharged and loaded from sampans and junks.

At the ports of San Francisco, Honolulu, and Manila these vessels are compelled to comply with the rat-guard requirements; they berth at rat-proof wharves, and the character of cargo taken on at these ports is such as not to afford a ready and handy harborage for rats.

At the oriental ports mentioned where cargo is loaded and discharged by sampans and junks, Shanghai is the only known port where lighters are regularly fumigated for rodent eradication; at the other ports the junks and sampans surround and tie up to the vessel in large numbers, and as the crews of these junks and sampans live on board of them, and as they are never fumigated for rodent eradication, and as the class of cargo which they load on the vessel is such as to afford rats a ready and handy nesting place, it is very reasonable to suppose that the vessels are constantly receiving a fresh supply of rodents at all these ports.

With regard to the large number of rodents trapped on the trans-Pacific liners, it should be stated that 99 per cent of trapped rats are from the Japanese liners of the Toyo Kisen Kaisha Steamship Co., which company pays a sen, equal to one-half a cent in our currency, to the crew for all rats trapped, and an accurate count of rats trapped during the year can be obtained; while the other companies in this trade do not reward their crews for rodents trapped, which accounts for the fact that hardly a single rodent is trapped on any vessel except the Japanese liners.

The following table shows the rat yield from fumigation and trapping on a few of the trans-Pacific liners during the past five years.

Name of vessel.	Times fumigated.	Rodents obtained.	Rodents trapped.	Total rodents.	Year.
China	4	35	....	35	1912
	5	16	1	17	1913
	6	10	....	10	1914
	3	14	....	14	1915
	3	21	....	21	[1] 1916
Nippon Maru	5	147	67	214	1912
	5	20	5	25	1913
	4	103	3	106	1914
	5	85	167	252	1915
	2	14	....	14	[1] 1916
Tenyo Maru	3	157	74	231	1912
	5	162	227	389	1913
	4	34	257	291	1914
	3	126	199	325	1915
	2	68	32	100	[1] 1916
Chiyo Maru (Wrecked Apr. 2, 1916.)	6	517	103	620	1912
	5	278	....	278	1913
	5	203	65	268	1914
	5	57	....	57	1915
	2	25	....	25	[2] 1916

[1] To July 1. [2] To April 1.

A trans-Pacific oriental liner makes a round trip from San Francisco to Hongkong and return in about two months, and for the past seven or more years the fumigation of these vessels has been regularly carried out on an average of at least three times a year, and yet in spite of this regular fumigation and in addition to trapping by the crew, the object of making these vessels rat free is yet to be attained.

The chief quarantine officer states that the Japanese companies propose in the future to have their vessels fumigated at San Francisco and it is believed that by a careful and complete fumigation of all parts of the vessel it is possible to obtain complete deratization, though, as pointed out in the report of the last fiscal year, it is questionable whether a sheathed vessel can ever be rendered rat free.

A complete and simultaneous fumigation of all parts of a vessel is blieved to be the only way in which a thorough and efficient fumigation can be effected. A partial fumigation of a vessel is of very doubtful value and is misleading as it tends to furnish a quarantine officer with a false sense of security.

This has been shown in several instances during the past year, but most particularly in the case of the Japanese steamer *Seiyo Maru*, which trades from Chinese and Japanese ports to the west coast of South America via Honolulu, San Francisco, San Diego, and ports on the west coast of Mexico and Central America, and is illustrated as follows:

Port.	Date fumigated.	Rats destroyed.	Rats trapped.	Total.	Parts fumigated.	Cargo.
Hongkong	Nov. 9, 1915	9	....	9	All but cabin quarters	General.
Valparaiso	Feb. 5, 1916	10	....	10	Holds	Empty.
Callao	Feb. 21, 1916	10	....	10	All except holds	Niter.
Balboa	Feb. 29, 1916	12	....	12	Fumigated for mosquitoes	Do.
Salina Cruz	Mar. 2, 1916	13	....	13	.....do	Do.
San Francisco	Mar. 18, 1916	12	....	12	All	Do.
Hongkong	May 11, 1916	28	[1] 14	28 [1] 14	All but cabin quarters	Empty.
		94	14	108		

[1] Mar. 18 to June 12, 1916.

If a complete and simultaneous fumigation of this vessel had been made when she was empty at Valparaiso, it is very probable that all the rodents on the vessel would have been killed, for the vessel only loaded niter and coffee and metal concentrates between Valparaiso and San Francisco, and did not touch a wharf at any port, therefore there was no chance of rats gaining admission to the vessel through the cargo.

2. Vessels bound for United States ports.—The local liners, 9 in number, plying between the islands and mainland ports, were either fumigated at Seattle or San Francisco during the year and yielded 117 rats.

The sailing vessels engaged in carrying lumber from the mainland ports were fumigated at Hilo and Honolulu, these being the only island ports where these vessels go alongside a dock, after discharge of their cargo and just prior to their departure.

3. Vessels engaged in interisland trade.—The interisland vessels were fumigated at regular intervals throughout the year, the fumigation of 48 vessels resulted in 96 rats being killed.

In the fumigation of all vessels at this port, a careful search has been made of all boats, dunnage, and coils of rope, frequently carried on the top of deck houses and on the poop deck, as well as the tubs for coiling the rope attached to the boat blocks have been searched for signs of rats, and with success in three instances.

In one case a nest of three young and a grown female were discovered in a rope tub, in another case three young rats were found within a coil of rope over which had been thrown a tarpaulin, while in the third instance, a number of full-grown rats were driven out of a mass of bamboo and matting which was stored on top of a poop deck house.

Recently Passed Asst. Surg. C. M. Fauntleroy, while traveling from this port to Hongkong on the steamship *China*, noticed rats on the boat deck and in the rigging and when a search was made several rats were found in the ship's boats, thus emphasizing the necessity for care and thoroughness in the fumigation of all vessels.

AID RENDERED OTHER GOVERNMENT SERVICES.

Board of health.—The remains of four persons, dying from leprosy at the Kalihi receiving station, were cremated at the quarantine station for the board of health.

One case of measles was removed from an arriving vessel and detained at the station upon the request of the board of health.

A large amount of media was prepared and a number of swabs sterilized for use of the board of health during the year.

Queen's Hospital.—Sixty mattresses and pillows were fumigated for the hospital for the eradication of vermin.

Lighthouse Establishment.—Because of a case of leprosy occurring in the person of a daughter of one of the keepers, an inspection was made of the Barbers Point Lighthouse, upon the request of the inspector of the nineteenth district, to determine whether any other of the personnel were affected with leprosy, as well as to examine into the sanitary condition of the station. All employees, as well as their families, were examined and found to be free of any evidence of leprosy, while nothing objectionable was found in regard to the sanitary condition except the method of the disposal of the garbage. This was simply dumped in a shallow hole in the lava rock a short distance from the dwellings and afforded a breeding place for innumerable flies.

The inspector was advised to have this garbage pit filled in and, in the future, to dump the garbage on the reef and where it would be covered by sea water.

United States Coast Guard.—Fourteen seamen were treated in the out-patient office and 28 in the hospital during the year.

Asst. Surg. L. E. Hooper held daily sick call on the *Thetis* and accompanied the vessel on several cruises, which accounts for the small number of seamen receiving out-patient treatment during the year. The *Thetis*, on April 25, departed for San Francisco and upon arrival there was condemned and sold.

Foreign consuls.—Eighteen seamen were admitted to hospital and two were furnished out-patient treatment upon the request of their respective consuls.

CREMATIONS.

The remains of seven persons were cremated at the quarantine station during the year, of which four were cremated on account of leprosy, on request of the board of health, one was an employee of the service, while the remaining two were relatives of employees at the station.

RAT CAMPAIGN.

Eighteen thousand three hundred and twenty-seven rats and mongoose were taken in the district of Honolulu during the year, of which 17,155 were trapped, 657 were shot from trees, 273 were killed by sulphur dioxide, and 9 were found dead, while 233 mongoose were trapped.

There was a reduction in the number of rats trapped amounting to 4,470 over that of the previous year, which was largely due to the dropping of one of the trappers on account of insufficient funds.

The rodent work in Honolulu, as well as in Hilo and along the Hamakua coast, is considered most important, for the islands are in close commercial relations with the plague centers of the Orient, west coast of South America, and, through the opening of the Panama Canal, with those of Europe. None of the wharves or the warehouses where cargo is stored is rat proof, and, therefore, only by the regular trapping and examination of rodents will plague, if it occurs, be promptly detected and the work of control thereby rendered much easier.

Suitable ordinances for rat proofing buildings, installing and covering garbage receptacles, as well as other measures to control the food supply for rodents, have yet to be enacted in the Hawaiian Islands. At several meetings, held during the year, the president of the board of health and the chief quarantine officer have urged the enactment of such ordinances, and it is hoped that some action in this direction will be taken in the near future.

Quarantine transactions at Honolulu, Hawaii.

Vessels inspected and passed	453
Vessels boarded and passed	54
Vessels inspected and detained for fumigation for mosquitoes	26

Vessels inspected and detained for fumigation for rat quarantine	15
Vessels inspected and detained for observation	1
Vessels inspected and allowed to transact business in quarantine	4
Vessels fumigated for rat quarantine	97
Vessels fumigated by request for eradication of vermin	12
Vessels arriving with quarantinable disease or having had same on board during the voyage	3
Number of passengers inspected and passed	69, 135
Number of crew inspected and passed	49, 167
Cases of contagious disease cared for by request of board of health	1
Number of port sanitary statements issued	558
Number of Canal Zone bills of health issued	14
Number of rats and mice killed on vessels by fumigation	276
Number of inspections of vessels for observance of rat guard precautions	535
Number of vessels on which cargo was inspected for rat signs	119
Number of pieces of freight passed	349, 126
Number of bundles of hides disinfected	11, 794
Number of autopsies	1
Number of cremations	7
Number of rats and mongoose trapped and destroyed	18, 327

Quarantine transactions at subports.

	Hilo.	Kahului.	Mahukona.	Lahaina.	Makaweli.	Koloa.	Total.
Vessels inspected and passed	31	19	5	1	14	1	71
Vessels fumigated for rat quarantine	61						61
Vessels fumigated for mosquitoes		3					3
Passengers inspected and passed	2,522	1	1	2	4	3	2,533
Crew inspected and passed	1,910	387	63	10	164	9	2,543
Number of port sanitary statements issued	110	87	12	2	26	1	238
Canal Zone bill of health issued	11						11
Baggage inspected and passed	65						65
Baggage and freight disinfected	65						65
Number of bundles of hides disinfected	2,454						2,454
Number of sheep and goat skins disinfected	538						538
Number of bundles of hides inspected and passed	2,454		810	248			3,512
Number of empty cement, sugar, and plaster bags fumigated	59,902						59,902
Number of barrels of glue stock disinfected	57						57
Number of rodents killed on vessels by fumigation	29						[1]29
Total							72,082

[1] Mus alexandrinus, 4; Mus musculus, 1; Mus norvegicus, 11; and Musrattus, 13.

Plague laboratory.

Total rats, mice, and mongoose taken	18, 327
Rats trapped	17, 155
Mongoose trapped	233
Rats found dead	9
Rats killed by sulphur dioxide	273
Rats shot from trees	657
Examined macroscopically	2, 891
Examined microscopically	15, 436
Showing pest infection	0
Classification of rats trapped:	
Mus alexandrinus	7, 670
Mus musculus	5, 262
Mus norvegicus	3, 054
Mus rattus	1, 169
Classification of rats found dead:	
Mus alexandrinus	7
Mus musculus	0
Mus norvegicus	1
Mus rattus	1

Classification of rats killed by sulphur dioxide:

Mus alexandrinus	54
Mus musculus	27
Mus norvegicus	8
Mus rattus	184

Classification of rats shot from trees:

Mus alexandrinus	534
Mus rattus	123
Total number of trappers	7
Number of traps set daily	984
Decrease in number of rats, mice, and mongoose caught, as compared with last year	4, 469

Cases of human plague on the Island of Hawaii from February, 1900 to June 30, 1916.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1900		1	2		1							1	5
1901													
1902													
1903			3						2				5
1904			1		2		1	1					5
1905						2	2						4
1906	1	1											2
1907								2		1			3
1908		1		1									2
1909								5	4	1			10
1910			8									1	9
1911	2			1						2			5
1912		3	1						1			3	8
1913	2				2								4
1914			1		1	1		1					4
1915										1	1	2	4
1916													
	5	6	16	2	6	3	3	9	7	5	1	7	70

Cases of rodent plague on the Island of Hawaii from Aug. 28, 1907, to June 30, 1916.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1907								11		32	4		47
1908		1										30	31
1909	6	3	5	3				4	15	7		1	44
1910	1		6	2								4	13
1911	1	1				4						1	7
1912	5	55	16	2					1	1	1	4	85
1913	4	6	1		1	1	1				2	1	17
1914	2							1					3
1915											7	5	12
1916	3												3
	22	66	28	7	1	5	1	16	16	40	14	46	262

Rodent work in Hawaii by the Territorial board of health for the fiscal year ended June 30, 1916.

Total rats, mice, and mongoose taken	136, 941
Rats trapped	134, 753
Rats found dead	93
Mongoose taken	2, 103
Rats and mongoose examined macroscopically	136, 841
Rats and mongoose examined microscopically	57
Showing plague infection	15

Classification of rats trapped and found dead:

Mus musculus	55, 425
Mus rattus	37, 036
Mus norvegicus	25, 998
Mus alexandrinus	16, 777

Number of cases of human plague	4
Rats not classified, found dead and trapped in plantation camps and burned	4, 602
Number of pieces of poisoned food placed	694, 140
Number of pieces taken	49, 139

Table giving foreign, oriental, and insular stations and transactions for the fiscal year ended June 30, 1916.

Stations.	Total number of vessels inspected.	Number of vessels fumigated.	Total number of passengers and crews inspected.
Aguadilla, P. R	1		9
Arecibo, P. R			
Arroyo, P. R	1		4
Callao, Peru	163	143	22,734
Cavite, P. I	8		780
Cebu, P. I	118	76	7,788
Fajardo, P. R	44		277
Guanica, P. R	165		8,153
Habana, Cuba	1,040	424	98,119
Hilo, Hawaii	92	61	4,520
Hongkong, China	342	89	47,921
Honolulu, Hawaii	702	150	121,916
Humacao, P. R	13		112
Iloilo, P. I	475	278	4,560
Jolo, P. I	41		3,457
Kahului, Hawaii	22	3	388
La Gauira, Venezuela	141		17,750
Makaweli, Hawaii	14		168
Mahukona, Hawaii	5		64
Manila, P. I	699	245	76,758
Mayaguez, P. R	152		8,559
Messina, Italy	35		88
Naples, Italy	319		34,283
Ponce, P. R	106	3	13,221
Puerto Mexico, Mexico	13	8	333
San Juan, P. R	342	50	37,650
Shanghai, China	143	32	27,247
Vera Cruz, Mexico	19	5	2,982
Zamboanga, P. I	32		2,578
Lahaina, Hawaii	1		12
Jobos (Aguirre), P. R	1		33
Tampico, Mexico	355	85	6,152
Progreso, Mexico	146	87	
Tuxpam, Mexico		23	
Koloa, Hawaii	1		12
Guayaquil, Ecuador	64	48	5,857
Palermo, Italy	76		5,104
Olongapo, P. I	2		407
Total	5,198	1,736	560,096

FOREIGN QUARANTINE.

CALLAO, PERU.

Acting Asst. Surg. J. L. Castro-Gutierrez reports as follows:

During the fiscal year 163 vessels were dispatched. Of these, 143 were fumigated before sailing, 20 were inspected and passed. There were 13,285 members of crews, 5,873 cabin passengers and 3,576 steerage passengers inspected, with issuance to the latter of 2,572 certificates of health. There were 3,381 persons vaccinated, as they came from localities infected with smallpox, and 2,456 pieces of baggage were disinfected and 236 pieces were inspected and passed, 251 certificates of inspection of certain class of suspected cargo being issued; and 28,841 disinfected hides and 85,276 poisoned skins were inspected.

PLAGUE IN PERU.

The number of cases of plague in Peru has been as follows during the calendar year 1915:

Departments.	Remaining cases.	New.	Recovered.	Died.	Remaining.	Unknown.
Ancachs		8	2	6		
Arequipa	10	23	18	15		
Callao		39	20	13	3	3
Lambayeque	2	102	56	38	5	5
Libertad	13	123	56	68	5	7
Lima	7	104	46	65		
Piura	8	52	22	33	2	3
Tumbez		4	1	3		
Total	40	455	221	241	15	18

From the monthly official reports are taken the following data showing the number of cases of plague which occurred in the Departments of Peru during the months of 1915:

Departments.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Ancash				4	2					2		
Arequipa	4	5	4		4	2	1		1	1	1	
Callao	7	7	1	3	3	1		3	3	3	2	6
Lambayeque	37	19	9	3	1			1	4	2	7	19
Libertad	25	18	5	8	7	4	6	6	11	10	5	18
Lima	19	18	3	9	2	1	2	12	12	12	7	7
Piura	31	12	1							2		6
Tumbez									3	1		

The number of cases of plague during the year has been little more than half of that for the preceding year, and was the lowest number since the appearance of plague in Peru. However, the decrease in cases can not be regarded as an indication of improved conditions with respect to the plague. It has not been the result of efficient sanitation measures but it is probably due to change in natural conditions.

Smallpox at Callao and Lima has decreased very much but is working havoc in the interior of the country.

In December of 1915, one case of yellow fever from Guayaquil died at Lima in the special lazaretto for that disease. Officially, the case was not accepted as yellow fever.

Several cases of leprosy exist at Lima among the Chinese and Japanese. The Peruvian Government intends to send them to their own countries. The newspapers at Lima announce that in Iquitos and the low Amazon Department there exist many cases of leprosy.

The deaths during the year at Callao have been distributed as follows:

Typhoid fever	18
Typhus fever	1
Malaria	27
Erysipelas	0
Smallpox	7
Measles	7
Scarlet fever	0

Whooping cough	3
Diphtheria	1
Influenza	8
Plague	1
Yellow fever	0
Tuberculosis of the lungs	332
Other forms of tuberculosis	58
Enteritis of 0 to 1 year	73
Enteritis from 1 to 2 years	20
Puerperal fever	5
Other diseases	866
Total	1,427

The death rate in Callao was 40.77 per thousand during the calendar year 1915.

GUANTANAMO BAY, CUBA.

Acting Asst. Surg. R. Spear reports as follows:

The duties of the public health officer at this station consist in inspecting incoming vessels and issuing bills of health to departing vessels. As the naval station is not an open port the only ships that come here other than naval vessels are the ships from the Ward Line which bring supplies from New York.

There is a quarantine camp at Caracoles Point equipped for handling infectious cases. This camp is primarily for use of the fleet, but can be used for infectious cases that may develop on the station.

During the past year two cases of smallpox were successfully treated at this place. The quarantine station lacks a disinfecting plant, and there are no facilities for disinfecting ships.

The common diseases in the eastern end of Cuba among the natives are hookworm infections, malaria, and tuberculosis. In about 1,500 stool examinations among the natives from different localities eastward from Santiago, including both coasts, over 50 per cent have been found to be infected with hookworm. Ascaris and trichocephalus infections are also very common.

Some very severe malarial infections have been seen among the natives. Asst. Surg. C. R. Baker, United States Navy, has examined the blood of 188 in this vicinity. Sixty-two per cent were positive for malaria, 48 per cent of which were of the estivo-autumnal variety. Malaria in this locality most frequently assumes a quiescent form and does very little apparent damage.

There are a number of lepers in the eastern end of Cuba. No attempt at segregation is made.

GUAYAQUIL, ECUADOR.

Passed Asst. Surg. Herman B. Parker reports as follows:

Maritime quarantine.—During the fiscal year 64 bills of health were issued to vessels bound to United States territory. Of these, 43 were bound to the Canal Zone and 21 to other ports in the United States. During this period there were inspected 3,865 crew, 1,158 cabin passengers, and 834 steerage passengers.

The following is a summary of the quarantine transactions for the year:

Bills of health issued	64
Vessels inspected and passed	16
Vessels fumigated	48

Number of crew inspected	3,865
Number of cabin passengers inspected	1,158
Number of steerage passengers inspected	834
Number of cabin passengers for United States ports	591
Number of steerage passengers for United States ports	210

Anchorage.—During the fiscal year all vessels entering Guayaquil anchored in front of the city. This, owing to cases of yellow fever, was considered as objectionable, and in order to insure greater security ships were sent down the river and there completely fumigated with sulphur prior to the embarkation of passengers and sailing. Vessels bound for San Francisco via Mexican ports or direct were inspected and passed, and the quarantine officer at the port of destination so informed. Vessels bound for New York through the Panama Canal were treated as though bound for the Canal Zone; while those vessels bound for New York via the Straits of Magellan were inspected and passed, owing to the necessity of fumigation in the southern coast ports and at the first port of entry in the United States.

Cargo.—The principal cargo from Guayaquil is cacao.

During the fiscal year nearly 1,000,000 quintals were shipped. In former years almost all the cacao was shipped to Europe and thence a small proportion to the United States; while this year, owing to war conditions, the most of it was first shipped to a United States port. This is not a dangerous cargo as regards plague, owing to the method of fermentation prior to shipment.

During the fiscal year hides were subjected to the usual arsenic treatment before shipment, and received in addition a sulphur fumigation after having been placed on board the vessel.

Wool is becoming annually a larger product of commerce of Ecuador and, while it is known that anthrax does not prevail, the methods of storing in Guayaquil have not met with approval on account of the existence of plague, and shippers were notified that unless greater precautions were taken in the erection of satisfactory bodegas outside of the plague zone the shipment of wool would be prohibited. The usual consular certificates, countersigned in this office, are required for hides, lana de ceiba, cotton, and wool.

Plague and yellow fever on outgoing ships.—As far as can be ascertained neither of these diseases appeared on outgoing ships during the fiscal year, and notwithstanding the monthly increase in these diseases during the year no cases were reported on ships in the harbor.

Bubonic plague.—In the annual report of 1914 it was mentioned that bubonic plague had not yet invaded the altitudes of the Andes, but this year the disease has passed over an altitude of 12,000 feet and appeared in the subtropical town of Ambato, which has an altitude of 7,000 feet. There were reported in this town 42 cases and 18 deaths. Rodents, including guinea pigs, are quite numerous in this town. In these small interior towns guinea pigs are a favorite article of food, and each house keeps its supply in about the same manner that they keep chickens. They also serve as household pets, which increases the danger from this disease. Strenuous efforts have been made to eliminate these foci in order to prevent the ingress of the disease into Quito, the capital of the Republic. Appended is a table of the disease for the calendar year 1915 and the first six months of 1916.

Dysentery.—Amebic dysentery still exists almost as an epidemic in the coast and interior towns of the Republic. The general use of emetine has done much in curing these cases, and the consequences of this disease, especially abscess of the liver, are seen less frequently. Bacillary dysentery still exists sporadically, but the use of serum has reduced the mortality.

Typhoid fever.—During the year a severe epidemic of typhoid fever occurred in Guayaquil, indirectly caused by the excavation of streets for installation of water supply. It was found in this work that many of the old supply pipes in the town were porous as the result of oxidation, but were more or less protected by the surrounding clay soil. This resulted in the contamination of the water supply of the town during the period of negative pressure in the pipes. Vaccination, however, was generally used, and at the present time only sporadic cases occur.

Tuberculosis.—Tuberculosis still contributes largely to the death rate and high mortality of the city.

Sanitation of Guayaquil.—During the fiscal year a new distribution system for the water supply has been completed, and work has well advanced on the reservoir. Surveys have been made of the various water sources, and, as soon as the economic conditions permit, this most important work will be completed.

Malarial fever.—Owing to the great diminution in the rainfall during the past rainy season, malarial fevers have not prevailed to the same extent as in former years.

Uncinariasis.—The service representative was the first to recognize and report in Ecuador a disease that exists so widely and is so well known. In the beginning of the work thymol was used as the standard remedy. During the past year oil of chenopodium has been used with far more efficient results than with thymol. Every effort is made to educate the ranch owners as to the nature of the disease and the simple methods that are necessary for its extermination.

Leprosy.—This disease is less frequently seen on the streets this year. During the past two years the bacteriological diagnosis has been made in 13 cases, and, as a matter of interest, several of these cases have been treated with the resorcin-chaulmoogra oil mixture, recommended in the Philippines, and in two cases, both young subjects, with marked amelioration of the symptoms.

Yellow fever.—During the calendar year of 1915 there was a notable diminution in the number of cases of yellow fever in Ecuador. These cases were so rare and infrequent that for a long time the existence of the disease was seriously doubted. An opportunity, however, was offered to see an autopsy, and the existence of the disease was confirmed as a result of the post-mortem examination. During the year also an almost entire absence of the stegomyia mosquito was noted. This was largely due to an efficient mosquito campaign. With the advent of the year 1916, owing to a scarcity of funds, the campaign was discontinued with an almost immediate recrudescence of the disease in epidemic form. From the 1st of January until June 30, 1916, there were reported in Guayaquil 133 new cases, of which 46 recovered and 78 died. This mortality indicates that only the more serious cases came under observation of the health department. Appended is a table giving the existence of the disease as reported during the periods mentioned.

Yellow fever in Ecuador during the first six months of 1916.

Town.	New cases.	Recovered.	Died.	Remaining.
Guayaquil	133	46	78	9
Milagro	5	3	2	
Duran	9	4	5	
Babahoyo	2	1		1
Total	149	54	85	10

Plague in Ecuador during the first six months of 1916.

Town.	Previously existing.	New cases.	Recovered.	Died.	Remaining.
Guayaquil	53	455	315	189	4
Duran		5	4	1	
Babahoyo		31	17	14	
Milagro		1		1	
Daule		13	4	9	
Ambato		42	24	18	
Alausi		167	61	106	
Portoviejo		10	6	4	
Rocafuerte		29	13	16	
Total	53	753	444	358	4

HABANA, CUBA.

Acting Asst. Surg. Richard Wilson reports as follows:

SUMMARY OF TRANSACTIONS.

The work of this office in brief was as follows:

Bills of health were issued to 1,827 vessels bound for the United States and its dependencies. This is an increase of 209 over the last fiscal year. This gives an average of a little more than 152 vessels a month, an increase in the monthly average of 17 vessels.

Of the 1,827 vessels receiving bills of health, 1,040 were inspected, because they were going direct to the United States or its dependencies.

On the vessels inspected the number in the crews was 60,806, and the number of passengers was 37,313.

Certificates of vaccination were issued to 101 passengers for the Canal Zone and Panama, who asked for them. No other health certificates were issued during the year, except late in June, 1916, when restrictions were placed on passengers from Mexico. As this was begun at the end of the fiscal year, only seven certificates were issued in the time that this report covers.

Fumigation of vessels for the purpose of killing rats was practiced throughout the fiscal year. Fumigations done in Habana are divided into two classes: First, vessels fumigated by the service. This includes all vessels going direct to the United States. Second, vessels fumigated by the Cuban authorities under the supervision of the service. These are vessels going to the United States via Cuban ports. In the last-named class the service fumigator is sent on board, and if he sees that the vessel is fumigated according to the regulations, he so reports, and a certificate to that effect is issued to the vessel.

In addition to these fumigations, the bills of health of some vessels recommend fumigation at the United States port of arrival, either on arriving at quarantine, on account of a violation of the regulations at Habana, or when empty, which means that the vessel had complied with the regulations here, except that the 30-day limit for fumigation had passed; and as the vessel was in transit with cargo (and possibly passengers), it was not advisable to fumigate it here, on account of the quantity or nature of the cargo. Many of these vessels were regular line steamers, with Habana as an intermediate port, where they stopped only a few hours, at most one day, and a fumigation here would seriously have affected their schedules.

Permits for embarking crated fruit and other merchandise liable to harbor rats were issued after inspection throughout the fiscal year. Most of these permits were for fruit, especially pineapples, but in this class was included also furniture, household goods, and other merchandise.

Permits issued in 1915–16	2, 938
Permits issued in 1914–15	2, 904
Increase	34

These permits were for "lots," not for "pieces." Sometimes several thousand crates were included in one permit. When the merchandise required more than one lighter to take it alongside the steamer, the regular permit went with the first lighter, and each additional lighter received another and smaller permit.

The driver of each wagon taking crated fruit, or other merchandise liable to harbor rats, that had been packed in the city in the presence of an inspector, received a small permit to take to the inspector on duty at the wharf where the merchandise was to be embarked, so that he would allow it to pass as soon as the large permit was presented, properly filled out for his approval.

Inspection of railroad cars for shipping loaded to the United States was begun in February, 1915, and has continued steadily. In the present fiscal year it has reached the limit that the ferryboat *Henry M. Flagler* can carry. Its capacity is from 28 to 32 cars, according to their size.

Railroad cars inspected in the 12 months ended June 30, 1916	5, 419
Railroad cars inspected in the 5 months ended June 30, 1915	1, 492
Increase	3, 927

Of the sick and disabled seamen attended during the fiscal year, 9 were sent to a hospital and 26 were treated at the office or on board, making a total of 35 men attended to on American vessels. Some foreign seamen also were treated.

PERSONNEL.

On July 1, 1915, the personnel of this office included Acting Asst. Surg. Richard Wilson, in charge, Acting Asst. Surg. I. P. Agostini, and nine sanitary guards and inspectors.

In compliance with department orders dated May 12, 1916, Surg. G. M. Guiteras came to Habana to inspect and report on sanitary conditions and to recommend changes in the regulations. He arrived on May 12 and, after completing the inspection, he returned to his station at Key West on May 26.

During the early part of the fiscal year the quarantine office was moved from the previous location to quarters in the new Machina Building, which is used for administration purposes by the Cuban immigration and customs authorities. A large room has been set aside for the use of the United States Public Health Service through the courtesy of Dr. Frank Menocal, commissioner of immigration.

THE FERRYBOAT "HENRY M. FLAGLER," ITS WHARF AND ENVIRONMENTS.

In the last annual report considerable space was devoted to the steamship *Henry M. Flagler* and the arsenal wharf, where it ties up. The immediate surroundings of the wharf were then in very bad condition, being in great part newly filled ground. These have been improved gradually and are now in good condition, but the wharf is still situated between the San Jose wharf and the city dump—two rat-infested places.

The ferryboat, which was an experiment last year, is a success this year. It has given such general satisfaction that a second ferryboat is being built, and a new wharf and a slip will be built in Regla. The place has been surveyed, but actual work has not yet begun.

RESTRICTIONS AGAINST PASSENGERS FROM MEXICO.

The bureau, in its letter dated June 8, 1916, having directed that * * * "no passenger in transit from Mexico will be permitted to sail for a port in the United States south of the southern boundary of Maryland except such passenger shall have been six days from port of departure before arrival at a United States port," * * * circular letters were issued to the agents of vessels that go to the southern ports of the United States and to those that bring passengers from Mexico to Habana giving instructions so that this provision would be enforced. This was begun on June 17.

TRANSMISSIBLE DISEASES.

In the last annual report mention was made that the quantity of water supplied to Habana by the Vento Springs was inadequate for the needs of a city as large as Habana had grown to be and that, to make up the quantity, water was taken from the Alemendares River, which was and still is very foul, and mixed with the Vento water. The result of this was evident in the increase in typhoid fever. During the present fiscal year this was discontinued, but the typhoid fever remained. Recently, on account of the retardation of the rainy season, the Vento water again became insufficient and again the Alemendares River has been used. Typhoid fever heads the list of communicable diseases during the past year with 400 cases, including 70 deaths. Of paratyphoid fever there were 41 cases, with 8 deaths.

Diphtheria comes next with 308 cases, including 19 deaths. This shows a decided increase in the second semester.

Measles and varicella occurred in the first semester, and with a very large increase in the second, giving a total for the year of 253 and 135, respectively. There were only 2 deaths from measles and none from varicella.

Particularly deserving notice is a small epidemic of cerebrospinal meningitis in the second semester. There were 19 cases, including 16 deaths. This disease was almost unknown in Habana.

In spite of these diseases the condition of Habana is good. The streets are in fairly good condition and are swept daily. The garbage is removed every night.

There were 98 cases of malaria, with 5 deaths. All the cases were traced to the interior of the island.

The number of cases of leprosy during the fiscal year varied from 240 to 250. Practically all of these were confined in the asylum at Habana, where they are sent from all over the island.

BUBONIC PLAGUE.

The beginning of this fiscal year saw the end of the third outbreak of bubonic plague in Habana. On July 1, 1915, there remained three cases under treatment, convalescing. Two of these had been brought from Guanabacoa as soon as the diagnosis was made. All three recovered.

On August 14, 1915, a man was taken sick with what was declared bubonic plague. The committee on infectious diseases saw him three times, the last time being August 27, when it was decided that the case was not plague.

The last case of plague in Habana was confirmed July 5, 1915, and was discharged cured on July 19. He was one of those brought from Guanabacoa. After this date no more cases were reported in the island. No rat plague was reported.

Although no plague was reported during the fiscal year the precautions were continued by this office. The local regulations of February 17, 1915, were enforced on vessels bound for the United States.

The inspection of passengers for the United States was discontinued during the tourist season because it put an unnecessary hardship on them.

In the end of May, 1916, the bureau revised the local outgoing quarantine regulations on account of plague, making them a little more severe. These were put into effect on June 7, 1916. These will be given in detail in another section.

The Cuban sanitary department has continued the work of deratization throughout the fiscal year. The total number of rats caught was 56,045; the total number examined was 25.823. No plague-infected rat was found. For details of this work see Table No. 6, inclosure No. 2. The last plague-infected rat in Habana was found May 12, 1915.

SPECIAL REGULATIONS FOR THE S. S. "HENRY M. FLAGLER."

HABANA, CUBA, *October 1, 1915.*

1. All cars bound for the United States must be inspected before being put on board the steamship *Henry M. Flagler.*
2. As soon as inspected and passed, the cars will be closed, and the inspector will seal them.
3. All cars must be mechanically clean, whether empty or loaded.
4. Empty cars will not be allowed to go with straw, paper, or other waste packing material strewn in it. All this must be removed and the car must be swept clean.

5. No loaded car will be allowed to be put on board if the doors can not be closed properly or if the doors or any other parts are broken so as to permit the entrance of rats under favorable circumstances.

6. Empty cars in more or less damaged condition may be allowed to be embarked if they are clean and both doors are left wide open. Such cars must not be sealed.

7. Cars suspected of harboring rats will be unpacked and repacked in the presence of the inspector, or fumigated, according to circumstances. If fumigated, the material required will be supplied by the owner or the shipper of the merchandise, and in the absence of these by the transportation company.

8. Rat-proof cars coming from the interior of Cuba and not opened in Habana will be inspected and sealed at once.

9. The cargo put on board cars in Habana will be inspected for rats prior to loading, and if suspected of harboring rats will be (a) rejected; (b) unpacked and repacked in the presence of the inspector; (c) fumigated.

10. The cars to be inspected must be placed in a convenient place in the yards.

11. No car will be put on the ferryboat until it has been passed and sealed by the inspector. In case this rule is violated the inspector will refuse to seal such cars until they are put on land, where they must remain sufficiently long enough to enable him to do his work properly.

12. The inspector is directed to use the greatest care and attention in carrying out the above instructions, remembering that the prime object of his work is to prevent the possibility of rats being carried on the cars bound for the United States.

13. The officers and employees of the transportation companies are requested to give the inspector every possible assistance, bearing in mind that delay in inspection may mean retardation of the departure of the steamer.

14. These regulations replace all others heretofore issued.

(Signed) Richard Wilson,
Acting Assistant Surgeon.

Habana, Cuba, *June 1, 1916.*

To the agents and consignees, etc.:

CIRCULAR LETTER.

The quarantine regulations for vessels leaving this port for points in the United States or its dependencies, issued under date of February 17, 1915, are hereby amended to read as follows:

Quarantine regulations to be observed at the port of Habana by vessels bound for the United States ports.

1. All vessels must take the following precautions to prevent the ingress of rats:

(*a*) Metallic rat guards not less than 3 feet in diameter must be used on all lines between the vessel and the wharf.

(*b*) Vessels must fend off 8 feet from the wharf.

(*c*) All planks and gangways must be removed at night, unless cargo is being shifted.

(*d*) Lighters operating at wharf must be supplied with rat guards as above.

2. (*a*) Every vessel leaving Habana for United States ports must have been fumigated at least once within the 30 days preceding date of sailing, preferably when empty and at the port of Habana.

(*b*) A duly executed certificate of fumigation from an officer of the United States Public Health Service, certifying that the vessel has been fumigated within one month prior to sailing will be accepted as evidence that the above provision has been complied with. No other certificate of fumigation will be accepted for this purpose.

(*c*) The ferryboat *Henry M. Flagler*, on account of its rat-proof structure, will not require fumigation, but the cars carried on it will be inspected before loading and fumigated if necessary. Cars coming from outside of Habana direct to ship's side will be sealed without inspection.

3. Cargo liable to be rat infested must be inspected before embarkation. After inspection, it must not lie over night on the wharf unless placed within a rat-proof compound.

4. Loaded lighters, unless immediately towed to the steamers, must be pulled off 25 yards from the wharf without connecting lines to the wharf.

5. These regulations supersede all previous ones, which are hereby annulled.

(Signed) Richard Wilson,
Acting Assistant Surgeon.

OPERATIONS OF THE SERVICE AT HONGKONG.

Passed Asst. Surg. C. M. Fauntleroy, in charge, reports as follows: Bills of health were issued to 342 vessels carrying 5,971 cabin passengers, 11,999 steerage, and 29,951 crew.

Eighty-nine vessels were fumigated under supervision of the service, and 256 rats were found dead after fumigations.

During the year 253 vessels sailed for ports in the United States and the Philippine Islands without undergoing fumigation.

The colonial government reports a total of 109,690 rats caught and 79 found to be plague infected.

Number of cases and deaths during year.

	Cases.	Deaths.		Cases.	Deaths.
Smallpox	256	199	Bubonic plague	87	81
Enteric fever	201	102	Cholera	9	8
Diphtheria	89	60	Paratyphoid fever	5	5

LA GUAIRA, VENEZUELA.

Acting Asst. Surg. W. J. S. Stewart reports as follows: This station is situated in the city of La Guaira, which lies within the confines of the Distrito Federal and which comprises three towns, one La Guaira proper and very old, being one of the first settlements made by the Spanish; Maiquitia, which lies on the railway connecting La Guaira and Caracas, distant about 1 mile; and the town or watering place of Venezuela, by name Macuto, also connected by electric railway with La Guaira itself. The last-named place is extremely pretty but damp and mosquito infested. It is by no means as healthful as Maiquitia and La Guaira, which for the greater part of the year are swept fairly clean by trade winds and kept freer from mosquitoes. The wharf is at La Guaira and so is the long breakwater pier (cement), where all foreign ships dock. The climate of La Guaira is hot and dry but, from the low humidity, the heat is not nearly so oppressive as in some places of higher latitude. There are a considerable number of transients in Macuto at the season of the year when the weather becomes cool in Caracas. The average calculated population is about 11,000 to 12,000. No one knows exactly, as there is no way of finding out, taking a census being out of the question. There is no way of ascertaining births or sickness or deaths amongst the poorest of the peon class.

Some years ago when bubonic plague was in this port, as well as yellow fever, the conditions were apparently ideal in many ways for the spread of the disease and yet, for some reason, this did not occur. The city is plentifully supplied with rodents at present, dead rats lying in the street awaiting the scavenger cart being a common sight.

All steamers come to the breakwater pier. This pier will accommodate three steamers of 500 feet and the most seaward of the three berths has a depth sufficient for any steamers that are likely to arrive for a long time to come

As regards passenger service, La Guaira and Caracas are well served. One can go to New York via Colon, or direct by the Red

"D" Line, or the Dutch Line, via some seven Haitian ports. To Porto Rico there is a choice between taking the American steamer every other week to Porto Rico via Puerto Cabello and Curaçao, or else going directly by the Spanish Line, arriving at Ponce the second day after departure from La Guaira. The freight liners of the Leyland or of the Harrison Lines do not carry passengers except occasionally a deck passenger along the coast, or in extreme cases. These steamers, except during the last year, all go to some southern United States port and it is the great exception for the captain of any of these steamers to know his exact destination.

The breakwater pier alongside of which the steamers lie is supplied with a double railway track and a few locomotives and flat cars, etc., to expedite the removal of the cargo from the pier after removal from the ship's hold. This is usually accomplished very expeditiously and usually in daylight hours, but little work ever being done here by artificial light. There is, however, a sufficiency—enough to get along with—of electric light to work at night whenever it becomes necessary. The tariff for such extra work at night is enormous and almost prohibitive.

The wharf and warehouses at Puerto Cabello are not in any manner rat proof and there would be great difficulty in making them so without destruction of the existing structures and the erection of new ones.

There has been no outbreak of quarantinable disease in Venezuela during the fiscal year under report, if there be excepted the outbreak (epidemic) of variola in Maracaibo and the States of Tachira and Merida in the western portion of the country. This outbreak was already existent at the date of the last report to the Surgeon General. The fact can also be stated that, as usual, yellow fever is present in endemic form in Maracaibo. This is always true of Maracaibo. No case of bubonic plague has been reported from any locality, the last cases being to the eastward of Caracas in some small villages there, in the spring of the calendar year 1914. There have been no deaths from yellow fever reported from Caracas, this city, or from Puerto Cabello. A few cases were reported unofficially from Valencia, State of Carabobo, but no official report could be obtained on the subject. Malarial fevers of a very severe form continue to be existent throughout the country.

Blackwater fever is also existent in the country and severe cases of it are often seen.

There were only nine deaths from malaria reported in La Guaira during the fiscal year.

In regard to the water supply of Caracas, the position is about the same as last year. A little money has been contributed for improvement of the surroundings of the canal by which the water, in part, comes into Caracas, but what is wanted is not alone a new source of supply, but an entirely new system of reservoirs, piping, and distribution. This is the only method which can be entirely successful.

Two unfortunate conditions still continue in force, unnecessary morbidity among newly born children by reason of infantile tetanus (Mozecuolo) and illegitimacy of children caused by disregard of marriage. Almost 70 per cent of all children born during the year 1914 were illegitimate. Child after child goes to the grave two or three days after birth with an infected navel.

SANITARY CONDITIONS IN THE STATES OF VENEZUELA.

During the three months ended September 30, 1915, which is the latest date for which statistics are available, i. e., mortality statistics, there were throughout Venezuela, in its 20 States, 2 territories, and 1 Federal district, in all, a total of 18,011 deaths, of which number 974 occurred in the Federal district, i. e., Caracas and the city of La Guaira with its suburbs of Macuto and Maiquitia. Of this number the causes were as follows:

Hookworm, 500; enteritis, 1,505; tropical dysentery, 1,479; typhoid fever, 401; malarial fevers, 2,716; pneumonia, 601; tuberculosis, 126; infantile tetanus, 713.

Yellow fever so steadily and insidiously takes its victims in those States that no notice is taken of the deaths, let alone the cases. In the last five years, until a year ago, Valencia cases could be found almost any time in the hospitals at Caracas, either the military hospital or Hospital Vargas. The disease has had a steady toll of the population for years and the immunes left in its track are numberless. Doubtless they form a high percentage of the population. Consequently a widespread outbreak could hardly occur at present and some years must elapse for the accumulation of nonimmune population. This same state of affairs is also true of the city of Maracaibo, where no attention is paid to sanitation or to the enforcement of the regulations of the Department of Sanidad.

MOVEMENT OF VESSELS, PASSENGERS, AND CREWS AT LA GUAIRA, VENEZUELA.

In all, during the fiscal year, 141 vessels called at the port of La Guaira requiring American bills of health. This includes almost all the steamers calling there except the Venezuela coast line and the one steamer a month English line to Trinidad.

Many of the steamers—that is, the French and Italian and Dutch steamers—stop at La Guaira en route to their American ports of destination, and then again stop here on the return trip to their home (European) ports.

All vessels receiving American bills of health were for New York or the Canal Zone, or for Porto Rico, there being 43 steamers going from here via intermediate ports, Puerto Colombia, Cartagena, and Curacao. There were 52 steamers of the Red "D" line and 12 of the Spanish line which called at Porto Rican ports.

Total number of crews inspected	12, 396
Number of passengers in transit	4, 653
Number of passengers for Colon	188
Number of passengers for New York	218
Number of passengers for Porto Rico	295
Number of pieces of luggage inspected, passed, and labeled	731
Number of vessels arrived during the year requiring American bills of health	141
Number of vessels calling here en route to Colon	43

NAPLES, ITALY.

Acting Asst. Surg. E. Buonocore reports as follows:

Report of the service at Naples, Italy, for the fiscal year ended June 30, 1916.

STATISTICS OF THE SERVICE AT NAPLES, ITALY.

Months.	Ships.	Emigrants.		Baggage.	
		In-spected.	Em-barked.	In-spected.	Disin-fected.
1915.					
July	25	853	842	587	412
August	27	986	965	1,105	740
September	27	1,475	1,448	1,020	1,040
October	39	2,482	2,443	2,185	1,775
November	38	1,180	1,161	1,140	855
December	23	830	805	730	660
1916.					
January	29	2,210	2,150	1,650	1,485
February	23	3,499	3,402	2,640	2,375
March	21	4,637	4,528	3,630	3,250
April	18	7,070	6,883	5,490	4,430
May	25	4,638	4,507	3,765	3,005
June	24	4,423	4,248	3,338	2,676
Total	319	34,283	33,382	27,280	22,703

REJECTIONS RECOMMENDED.

Months.	Tra-choma.	Favus.	Suspected tra-choma.	Other causes.	Totals.
1915.					
July	10	....	....	1	11
August	15	....	2	4	21
September	15	1	1	10	27
October	25	2	3	9	39
November	14	....	3	2	19
December	17	1	2	5	25
1916.					
January	33	....	15	12	60
February	49	3	25	20	97
March	76	2	13	18	109
April	144	7	7	29	187
May	88	3	10	30	131
June	124	2	18	31	175
Total	610	21	99	171	901

COMPARISON WITH LAST TWO YEARS.

Year.	Emigrants.		Baggage.		Rejections recommended.
	In-spected.	Em-barked.	Disin-fected.	Passed.	
1913–14	168,743	162,827	192,081	43,044	5,916
1914–15	28,626	27,954	25,391	19,651	672
1915–16	34,383	33,382	22,703	27,280	901

Report of the service at Naples, Italy, for the fiscal year ended June 30, 1916—Continued.

STATISTICS OF THE SERVICE AT PALERMO, ITALY.

Months.	Ships.	Emigrants.		Baggage.	
		In-spected.	Em-barked.	In-spected.	Disin-fected.
1915.					
September	1	34	32	30	14
October	8	620	584	758	281
November	2	257	251	403	127
December	8	474	455	646	239
1916.					
January	8	297	284	230	138
February	6	912	895	820	429
March	9	509	493	475	228
April	12	833	817	835	259
May	11	414	402	399	111
June	11	754	718	721	287
Total	76	5,104	4,931	5,317	2,113

REJECTIONS RECOMMENDED.

Months.	Tra-choma.	Favus.	Sus-pected tra-choma.	Other causes.	Totals.
1915.					
September	2				2
October	32			4	36
November	5			1	6
December	19				19
1916.					
January	10	1		2	13
February	9		2	6	17
March	9	1		6	16
April	10			6	16
May	9			3	12
June	21	2		13	36
Total	126	4	2	41	173

STATISTICS OF THE SERVICE AT MESSINA, ITALY.

Months.	Ships.	Emigrants.		Baggage.	
		In-spected.	Em-barked.	In-spected.	Disin-fected.
1915.					
October	4	43	42	83	12
November	4	45	45	96	10
December	3				
1916.					
January	3				
February	1				
March	4				
April	3				
May	6				
June	7				
Total	35	88	87	179	22

Rejection recommended: One in October, 1915, on account of trachoma.

EMIGRANTS FROM LEVANT FOR THE UNITED STATES HELD IN OBSERVATION AT THE DETENTION HOUSE, NAPLES, DURING THE FISCAL YEAR ENDING JUNE 30, 1916.

Number in observation.	Number embarked.	Recommended for rejection.	Not embarked for reasons other than medical.	Still under observation June 30, 1916.
12,000	10,725	393	342	540

PUBLIC HEALTH IN ITALY.

During the fiscal year ended June 30, 1916, the public health in Italy has been good, notwithstanding that during the Italian advance on the river Isonzo health conditions were at first unsatisfactory, but owing to the sanitary measures adopted by the civil and military authorities and the Italian Red Cross, epidemic diseases (cholera and typhus) have been eradicated in the infected districts. This sanitary work was also carried out in the Northern Provinces of the Kingdom, where a few cases occurred (Venice, Leghorn, etc.).

It is well to remember that besides the isolation stations, hospitals, etc., in the war zone, the most efficacious means for the prevention of cholera is examination for bacillus carriers, and the measures adopted are such as to permit of several thousand examinations being made daily. This method was suggested and recommended by the officers of the United States Public Health Service at this station during the cholera epidemics in Naples of 1910 and 1911, and was adopted at Naples, Genoa, and Palermo for all emigrants destined for the United States.

Another measure adopted has been the vaccination of all soldiers and sailors for smallpox, cholera, typhoid, and paratyphoid.

The abundant use of antitetanus serum for the wounded has banished tetanus from the military hospitals in the war zone and the sanitary bases.

Notwithstanding scattered cases of cerebrospinal meningitis among the troops, there have been no epidemic foci. In a few localities cases appeared among the civil population, but there were no epidemic centers. In the prophylaxis for this disease ample examinations have been made for bacillus carriers.

TYPHUS AND CHOLERA IN THE LEVANT.

During the fiscal year 12,000 emigrants arriving from the Levant were held for observation in the detention house at Naples, as coming from places where typhus and cholera prevailed or were suspected of existing. On entering the detention house these persons were bathed, then rubbed with an ointment of 1 per cent anethol, and a bacteriological examination of feces made. Twenty-four bacillus carriers were found, but in no case did the presence of the vibrios last more than two weeks. The baggage and the clothes worn by these emigrants at the time of their entering the detention house were disinfected, their baggage being again disinfected on the day of sailing. During the period of detention all these persons enjoyed perfect health with the exception of one case of varioloid (the contacts undergoing the measures prescribed by the United States Quarantine Regulations) and six cases of measles among the children.

By an arrangement between the Italian sanitary and emigration authorities all emigrants for foreign countries entering Italy from infected or suspected districts are collected in the Naples detention house. Before being permitted to embark, these emigrants must present an official document signed by the Italian naval officer in charge of the detention house, declaring that the bacteriological examination of the feces showed a negative result.

The presence of an acting assistant surgeon in Sicily, who regularly informs the Naples office concerning the health conditions of the island, which is in close proximity and direct communication with the Levant, is of great advantage in preventing any surprise from that quarter.

SHANGHAI, CHINA.

Acting Asst. Surg. S. A. Ransom reports as follows:

Transactions.

Vessels spoken and passed	19
Steamers inspected and passed	143
Steamers disinfected	32
Sailing vessels inspected and passed	1
Sailing vessels disinfected	0
Number of crew on steamers	17, 331
Number of crew on sailing vessels	16
Number of passengers on steamers	9, 900
Number of passengers on sailing vessels	0
Number of bills of health issued	162
Number of persons bathed	109
Number of pieces of baggage disinfected	0
Number of pieces of freight viséed	702, 763
Number of pieces of freight disinfected and certified	26, 679
Number of vaccinations certified	0

During the fiscal year ended June 30, 1916, the work at this station shows a slight decrease as compared with that done during the corresponding period 1914–15. There were, however, increases in some directions, as will be seen from the accompanying tables.

Disinfection or fumigation of vessels to kill vermin was carried out as heretofore in almost every instance with sulphur gas, generated by the pot method. In one instance, however, a Clayton apparatus installed on the steamship *Merionethshire* (for controlling fire) was used with remarkably satisfactory results, 72 dead rats having been found distributed throughout the ship at the conclusion of the operation, notwithstanding the fact that the ship was only one year old and this office was assured by the officers that there were no rats in her. This same assurance is frequently forthcoming from officers on any ship fumigated. There were fumigated this year 32 vessels, as compared with 15 last year, which increase is accounted for by the fact that many Japanese and a few other tramp steamers have been put on the run between the Orient and the Pacific coast to replace the tonnage taken off by the Pacific mail and by reason of the war. In addition to the above there were fumigated with sulphur 348 lighters used for conveyance of cargo to ships bound for American ports.

Decreases were noted in the following items: In crew carried, 3,595; in passengers carried, 3,215; in number of persons bathed, 143; in packages of freight carried, 165,144; in pieces of freight disinfected, 791; all of which may be accounted for by the lack of tonnage available.

The number of bills of health issued decreased by four only, showing that it was more a lack of size than in the number of ships clearing from here which was accountable for the decreases above referred to.

No vaccination certificates were issued during the year by reason of the fact that the incidence of smallpox in Shanghai was so low that it was not thought necessary to enforce vaccination among the personnel of various vessels taking bills of health from this office.

During the period under consideration there were investigated 12 cases of illness which occurred on vessels taking bills of health from this office. One case of leprosy was reported as occurring in the person of a Chinese member of the crew of the U. S. gunboat *Samar*. There was also one case of typhus fever on the U. S. S. *Brooklyn* in June.

The inspection of cargo destined for United States ports and the disinfection and certification of same where necessary, including particularly bristles, human and animal hair, hides, and second-hand personal and household effects, has continued throughout the year as heretofore, and all cargo destined for American ports has been passed upon by this office before the same is loaded upon lighters to be conveyed to ships. Considerable uncertainty has arisen with regard to the treatment to be required for shipments of hides, owing to sudden changes as to the disinfection required, put into force at ports of arrival, particularly New York. It has heretofore been the rule, under instructions from the State Department, to pass without disinfection all hard sun-dried cowhides. Early in the year, however, information was received here through shippers that various consignments of this class of cargo accompanied by properly authenticated certificates had been refused entry at New York because of lack of disinfection. No official information of this action, or of the reason therefor, or of any change in the requirements was received here until about six weeks later, when it was learned that all cowhides of whatever description were to be disinfected with 1 to 1,000 solution of bichloride of mercury. This process has since been carried out.

There still seems to be no adequate measures provided for the prevention of the entry of anthrax, riderpest, foot-and-mouth disease, etc., into the United States through sheepskins, deerskins, goatskins, wool, etc.

Vessels bound for United States are, during their stay here, required to lie in stream to prevent rat invasion; to use ratguards on lines to all lighters (which latter are periodically fumigated), and to undergo general fumigation when empty. Loading by daylight is required as far as practicable. The total number of lighters fumigated between July 1, 1915, and June 30, 1916, was 348, and 138 dead rats were found upon completion of the treatment.

In this connection it may be stated that the Shanghai Disinfecting Co. has just completed a new floating disinfecting plant. The boat is constructed of steel, is 98 feet in length by 20 feet beam, and draws 4 feet of water. She has a house which provides a pilot house, an office, an electric light plant, a plant for generating SO_2 and another for CO_2 gas, with an experimental chamber to test on rats the toxicity of the gas being pumped into the space to be disinfected. In the middle of this house is provision for shower baths for about 30 men at a time, warm water being supplied from steam-heated tanks overhead. Clothing removed by bathers is sent down a chute to the infected end of the boat and then disinfected in the jacketed steam chamber before delivery to their owners, who after bathing are sent below to a clean space into which the disinfecting chamber opens. This space has 11 feet head room and ample air ports and is fitted with removable bunks to accommodate 65 men for sleeping in case it is necessary for them to remain on the disinfector over night because of the fumigation of their quarters.

Many of the details for the construction of this plant were supplied by this office, and the plant has its approval as generally efficient.

Vessels and personnel from Shanghai destined to American, Philippine, and Canal Zone ports are inspected as near as possible to the hour of sailing, and bills of health issued at the time of inspection.

The health of the settlement, with regard to minor contagious diseases, remains about the same as during the previous year.

Smallpox showed a decided decrease during the year just closed, there being reported but 5 cases among foreigners and 4 deaths among natives, as compared with 59 and 182 last year.

Plague was responsible for the death of 1 native during the year just closed, as compared with 16 in 1914–15. This death occurred in the month of October.

Cholera was entirely absent from the mortality report for the year 1915–16.

There were 10 cases of tuberculosis reported among foreigners and 977 deaths from that disease among natives.

Dysentery showed an increase among foreigners from 80 to 110 cases. There was a decrease of 6 deaths from this disease among natives.

Rat plague continues to appear sporadically. Between November and May, out of 12.925 examined 7 rodents were found to be infected.

Leprosy, typhus fever, relapsing fever, beriberi, rabies and diarrheal disease continue present as heretofore. During the fall of 1915 rinderpest and foot-and-mouth disease were very prevalent in this settlement and, as far as can be learned, throughout China. The municipal veterinarian advises that these diseases are never entirely absent. There were also said to have been a few cases of anthrax among horses and cattle in this settlement.

Table No. 2 appended shows the morbidity among foreigners and mortality among Chinese, as reported to the local health department.

There continues to be no requirement compelling the report of contagious disease.

The water supply of Shanghai and for the shipping is secured, as heretofore, from the Whangpoo River, below the settlement. This water in its original state is very muddy and contains quantities of sewage. The impurities are removed to a large extent by means of sedimentation and sand filtration, which renders the water usually clear and fairly free of bacteria. Bacilli of the colon group are, however, usually found present in 1 cubic centimeter quantities of water. This content fluctuates, however, with greater demand for water, when the process of filtration is possibly less thorough than when smaller quantities of water are required.

MEXICAN PORTS.

PROGRESO, MEXICO.

Acting Asst. Surg. H. E. Gimler reports as follows: There were 146 vessels examined, 87 being fumigated before departure.

PUERTO MEXICO, MEXICO.

Acting Asst. Surg. G. McG. Stewart reports as follows: The activities of the service representative at Puerto Mexico, Mexico, dated from April 29, 1916, upon his return from a sanitary inspection of the Tabasquenia and Filisola fruit plantations on the Uspanapa River, this being a special duty ordered by the Surgeon General. He was compelled to leave his post of duty, along with practically all other Americans, on June 21, 1916, because of the hostile attitude of the Mexican authorities and people.

During the period April 29 to June 21 there were the following quarantine transactions:

Steamers inspected and passed	4
Steamers fumigated with hydrocyanic-acid gas	5
Steamers fumigated with sulphur dioxide	3
Steamers receiving no quarantine procedure	1
Number of passengers inspected and passed	24
Number of crew inspected and passed	300

During the period stated the medical officer kept a close watch for the appearance of any quarantinable diseases in Puerto Mexico and its vicinity and, with the exception of smallpox, was unable to detect evidence that any other existed. The records of the civil judge were investigated weekly, the Federal health officer was interviewed weekly, any rumors relative to sanitary conditions were given ear to, and numerous persons known to the medical officer were consulted upon this subject, either directly or indirectly

TAMPICO, MEXICO.

Acting Asst. Surg. Oscar J. Mayer reports as follows:

The number of vessels clearing from the port of Tampico for United States ports during the three months of April, May, and June of the 1916 quarantine season embraced 7 passenger ships and 164 oil tankers and oil barges. One thousand nine hundred and forty-eight passengers, including over 1,200 refugees and 4,204 members of crew, were inspected. Eighty-five ships were fumigated with sulphur dioxide.

The extraordinary political conditions of the country have had some effect on the economic conditions of this port. Absolute shortage of food supplies, prevailing high prices, in many instances amounting to over 200 and 300 per cent increases, have had their influence on public health, especially in the increase of gastro-intestinal disorders. The still prevailing old nomenclature of diagnosis and consequent classification of deaths do not always give a correct idea of health statistics, and the irregular, semiofficial notices, difficult to obtain from the local authorities on death rates and the causes of deaths, are somewhat confusing as well as misleading, giving cause to suspicions of attempts at concealment, even if such is not intended.

TUXPAM, MEXICO.

Acting Asst. Surg. L. M. Taylor reports as follows:

Health and sanitary conditions obtaining at the town of Tuxpam, 10 miles up the river from the shipping port, are most deplorable. No effort is made to clean the place except by the aid of a few prisoners unfit for military service.

A number of native medical men have been driven out on account of political opinions; the place is at present headquarters of the military commander of the State and concentrating point for a large body of diseased troops; shortage of food and almost no drug or surgical supplies; appalling indifference of the inhabitants toward their physical welfare and their apparent utter hopelessness are some of the conditions that have contributed to the present state of filth, disease, and abandonment.

Statistics as taken from the civil records and private sources of information are appended below. Infant mortality is very great and is not included therein. Several cases have been reported as being possibly yellow fever, but upon personal bedside investigation the suspicion in each case was proven unfounded.

Principal causes of death January 1–July 1, 1916.

Malaria	158	Pneumonia	18
Smallpox	143	Other noninfectious causes	117
Dysentery	74		
Tuberculosis	35	Total	566
Typhoid	21		

Population of county, 13,000.

In reviewing conditions at the port of Tuxpam a distinct difference should be made between the town proper and the shipping point. The latter is situated at the mouth of the river on two large islands owned by the companies exporting oil, at which place every effort is made to maintain a high standard of health.

On each island a gang of men is constantly employed to clean up, cut weeds, lime the few remaining cesspools, and frequently change their location, open drainage ditches, and wage warfare on the land crabs. A guard established last year during the smallpox epidemic has been made a permanent feature. The coconut grove has been further depleted this year, tank farms have been drained, dykes built to prevent high tide from overflowing the swamps, and it is proposed to fill in the latter with sand dredged from the river. A large area has been cleared of underbrush and a sewerage system has recently been completed. The population is 1,600. Diseases, principally malaria and dysentery. Only one case of typhoid and no smallpox has appeared during the period covered by this report, January 1 to July 1, 1916.

All vessels loading oil at the port remain in absolute quarantine; they are loaded slightly over 1 mile at sea through pipe lines; there is no communication with ship except by power surf boats owned by the loading companies, and it has been made a fixed rule to allow no member of crew or officer to come ashore. The service officer, in addition to his duties of inspecting the crews and fumigating all ships bound for southern ports, is employed by the companies to superintend the sanitation of the port as far possible in view of the intolerable conditions existing in Mexico.

Twenty-three vessels have been disinfected to date.

VERA CRUZ, MEXICO.

Acting Asst. Surg. L. B. Cooke reports as follows:

On account of the disruption of passenger service between southern ports of the United States and Mexico, service representative assigned to the port of Vera Cruz was delayed in reaching his post until April 29.

Upon arrival there he found conditions very unsatisfactory, sewage being inefficiently disposed of, the water supply inadequate, and the enforcement of sanitary measures in the hands of the military, who were apathetic toward all foreign interests.

Under these circumstances the service representative found it quite impossible to interest the local health authorities in the improvement of sanitation or in the erection of barriers for the purpose of preventing contagion from Mexico reaching the United States. Thus efforts looking toward the establishment of a station for the disinfection of passengers and their effects bound for the United States and suspected of harboring typhus carrying pediculi came to naught.

In order to avoid any danger from this source arrangements were made with the local steamship agencies by which all intermediate and steerage passengers for the United States were required to present themselves, and, if thought necessary, their baggage and effects also, for examination by the service representative previous to embarkation, and in case pediculi vestimenti were found they were refused passage.

With the advent of the rainy season no campaign was inaugurated directed toward draining storm sewers and gutters, oiling collections of water, or screening cisterns. With a considerable per cent of the population consisting of nonimmunes from the interior, and with more or less travel between Vera Cruz and other southern ports of Mexico, it would seem that an outbreak of yellow fever should not cause great surprise at any time. To prevent the infection reaching the United States, strict inspection of passengers and crews and the fumigation of vessels against mosquitoes was carried out.

The comparatively small number of deaths from smallpox occurring in Vera Cruz during the period April 29 to June 30, 1916, caused the service representative to consider it not necessary to institute any extra precautions against its introduction into the United States.

During the period between April 29, 1916, and June 30, 1916, 19 vessels were inspected, 2 vessels (naval vessels) were issued bills of health without inspection and 5 were fumigated for destruction of mosquitoes. There were 1,691 passengers and 1,291 crew inspected, no case of quarantinable or contagious disease being discovered.

At the time this report was made the political situation in Mexico was extremely critical, all Americans for the second time within a week being advised and strongly urged by the Secretary of State to leave Mexico at once. This was being done with expedition and it seemed that in a short time but few Americans would be left in the Republic. During this exodus it was impossible for the service representatives to inspect all refugees but, with the naval surgeon in charge, he saw some 312 refugees aboard the U. S. S. *Nebraska*, where one case of smallpox was discovered, which was promptly put ashore. No further cases appeared.

Mortality report of Vera Cruz, Mexico, from April 29 to June 30, 1916.

Population (estimated) 40,000.

	Deaths.
Typhus fever	4
Smallpox, 19 cases	17
Acute gastro-intestinal diseases	89
Dysentery	5
Cholerine	1
Malaria	12
Icterus	1
Typhoid fever	12
Tuberculosis (all varieties)	59
Total	200
All other diseases	215
Grand total	415

Rate per thousand, 67.4.

MEDICAL INSPECTION OF IMMIGRANTS.

During the fiscal year ended June 30, 1916, there were examined by medical officers of the United States Public Health Service 481,270 immigrants, for the purpose of detecting physical or mental defects, when present, that would operate to the exclusion of the alien, in accordance with the United States immigration laws.

This number of aliens examined, as compared with 562,263 for the previous year, shows a reduction of 80,993. The number certified for physical or mental disabilities was 16,327, in contrast to 17,480 so certified during the preceding year.

The number of officers assigned to medical inspection has fluctuated during the year, but on an average 90 officers were exclusively engaged in this duty. Immigration examination, however, was performed to a greater or less degree by many service officers stationed at marine hospitals and quarantine stations.

Several officers stationed at consulates in foreign ports conducted examinations of intending immigrants. This procedure does not contemplate the issuance of a certificate, nor does it prevent the embarkation of the alien examined, even though he is found to be defective. It affords opportunity, however, for information from the medical examiner to the intending immigrant and to the steamship agent as to any defect that may operate to prevent the admission of such alien into the United States. To a very considerable extent this examination of aliens desirous of coming to America prevents loss of time and money to a number of them whose physical or mental condition would render them excludable as immigrants. A medical officer stationed in a foreign port, therefore, acts merely in an advisory capacity, the official certification of deportable defects being made by service officers assigned to immigration stations in the United States, its possessions, and dependencies.

A marked reduction of immigration during the past two years has afforded opportunity to medical officers to conduct a more intensive examination of the mentality of arriving aliens. The increased efficiency in detecting mental defectives is shown by a comparison of the percentages of this class of cases during the past four years.

At the port of New York in 1913 the number of aliens certified as mentally defective was 50.8 per 100,000; in 1914, 96 per 100,000; in 1915, 135 per 100,000, and in 1916, 118 per 100,000. The chief medical officer at Ellis Island is of the opinion that the reduction in mentally defectives detected during 1916 was due to restricted immigration from certain countries in Europe, chiefly by reason of the European war. The generally increased proportion of mentally defective aliens certified, however, can not be attributed entirely to such temporary conditions as a diminution in the bulk of immigration and the relative increase in medical examiners. The policy of assigning to medical inspection an increasing proportion of officers specially trained in psychiatry has been a big factor in obtaining these results. More attention each year is being devoted to this phase of immigration inspection, and the increasing percentage of mentally abnormal immigrants discovered has demonstrated the value of the work.

The activity of the officers engaged in the mental examination of immigrants has not been confined alone to such examination, but has extended to valuable research and investigation along those lines. A notable contribution to the general knowledge of mental diseases has been Passed Asst. Surg. Mullan's study of the psychology of the arriving alien. Several standardized devices for determining feeblemindedness have been perfected by various service officers. A manual by the service officers stationed at Ellis Island for guidance in determining diseases has been in the course of preparation during the past two years. It is now near the stage of completion and promises to be of valuable assistance not only in the examination of immigrants but to the medical profession at large.

The general conduct of the medical inspection of immigrants during the past fiscal year has been along the lines evolved during the preceding year. In general, the examination consists of the preliminary or primary inspection for the purpose of detaining all those who are obviously defective, and also those presenting any condition or appearance suggestive of abnormality. A secondary and more rigid examination is made of those detained on primary inspection. This may embrace a thorough physical examination of the immigrant when stripped of clothing in a private room, and, when deemed advisable, it includes laboratory examination of the blood and all secretions, and continued observation in the immigration hospital.

It is believed that the number of officers now engaged in the medical examination of arriving aliens is sufficient to prevent the admission of physically defective persons, but the examination for detecting mental diseases requires such painstaking and tedious detail that additional officers for this kind of work are urgently needed in order that such examinations may be made with the necessary thoroughness and efficiency, and at the same time with the dispatch demanded in routine immigration inspection.

The type of immigrant that will seek admission to the United States after the European war shall have ended is problematical. There seems to be no question that a very considerable exodus from Europe will occur. The economic reasons that have heretofore influenced immigration during the past 20 years will undoubtedly obtain in greater force at the termination of the war on account of the impoverished condition of the devastated countries. It seems assured that the number of physically disabled immigrants will be increased, and while the number of mental defectives may or may not relatively increase, the total number of these persons will undoubtedly be greatly raised. To accomplish the same painstaking mental examinations after the expected exodus from Europe takes place as is now being performed will require a much larger number of medical officers trained in the examination for detection of mental diseases.

As an index of the increasing efficiency of the medical examination of arriving aliens there are given in the following table the percentages of defectives, both mental and physical, recorded at all the immigration stations by officers of the Public Health Service in the period 1912–1916. While the increase in certifications has not been marked in any one year, the figures indicate, nevertheless, a steady and progressive increase in the number of alien defectives discovered by the medical examination during the period referred to.

Fiscal year.	Total immigrants examined.	Total immigrants certified.	Percentage of all immigrants certified.	Number certified for mental defect.	Percentage of certifications defect. for mental
1912	1,143,234	27,021	.0236	286	.0105
1913	1,574,371	38,558	.0244	883	.0229
1914	1,485,957	41,250	.0277	1,360	.0329
1915	562,263	17,840	.0317	606	.0339
1916	481,270	16,327	.0339	573	.0350

Aliens inspected and certified at all ports and places in the United States and its dependencies and in Canada.

	Number of aliens examined.	Aliens certified.					Important diseases for which certification was made.										
		Class A. (1) Idiocy, imbecility, feeble-minded, epilepsy, insanity, and tuberculosis.	Class A. (2) Loathsome contagious or dangerous contagious.	Class B. Disease or defect which affects ability to earn a living.	Class C. Disease or defect of less degree.	Total.	Trachoma.	Tuberculosis.	Insanity.	Idiocy.	Imbecility.	Epilepsy.	Feeble-minded.	Favus.	Syphilis.	Tinea tonsurans.	Gonorrhea.
Arecibo, P. R.																	
Astoria, Oreg. (Columbia River quarantine)	1,527		4		12	16											4
Baltimore, Md.	170		8	12		20									3		5
Biscayne Bay quarantine, Miami, Fla.	1,800	1	3	3	1	8	3						1				
Blaine, Wash.	114		15	7	1	23	14	1									
Boston, Mass.	13,714	14	22	376	1,008	1,420	9	1	2		1	2	9	5	3		3
Brownsville, Tex.	4,857	9	206	216	6	437	22	1	1			1	5		3		6
Buffalo, N. Y.	8,154	33	18	400	250	701	4	7	9		1	2	8	2	3		5
Calexico, Cal.	447	5	9	2	4	20	1	5									5
Charleston, S. C.	21	2	1	4		7		1				1					
Chicago, Ill.	38	2		2		4							1				
Del Rio, Tex.	2,644	2	33	1		36	33						1				1
Detroit, Mich.	7,784	43	37	365	346	791	18	9	5			6	24		1	1	17
Douglas, Ariz.	6,063	6	63	7	1	77	62		3				3		1		
Duluth, Minn.	4,036	3	2	9	16	30	2	1		2							
Eagle Pass, Tex.	14,552	9	12	25	63	109	4	3	1			2	1	1	4		
Eastport, Idaho	2,300	2	2	191	5	200		2							1		1
El Paso, Tex.	26,244	35	11	144		190	4	9	13			4	9		4		
Everett, Wash.	54																
Fajardo, P. R.	62																
Galveston, Tex.	102		2	5		7											1
Guanica, P. R.	199				3	3											
Halifax, N. S.	2,128	4		35	34	73		2				1					
Hildalgo, Tex.	8,316		179			179		1									
Honolulu, Hawaii	4,077	3	73	78	18	172	44	2					1		3	1	8
Houlton, Me.	61	5		3		8					3		2				
International Falls, Minn.	627	5		24	15	44		1									
Ketchikan, Alaska	309		3			3	3										
Key West, Fla.	5,274	1	4	5		10	4		1								
Laredo, Tex.	30,360	23	44	280	155	502	21	1	5	4	1	2	10	5	1	10	
Lewiston, N. Y.	419			17	2	19											
Los Angeles, Cal.	2,111		3			3											

Marcus, Wash	423			48	17	65							1				
Mayaguez, P. R	62																
Mobile (Ala.) quarantine	59				1	1											
Montreal, Canada	16,225	44	30	506	292	872	21	31	4	3	3	1	2		3	2	2
Naco, Ariz	4,931	7	34	2	1	44	26		2			4	1		6		2
New Orleans, La	3,993	6	20	15	13	54	8	3	3						7		
New Orleans quarantine station	910																
Newport News and Fort Monroe, Va	1,020																
Newport, Vt	888	5		35	11	51		3					2				
New York, N. Y	176,461	300	496	4,816	225	5,837	303	105	54	5	9	4	192	6	20	5	33
Niagara Falls, N. Y	8,416	7	27	241	78	353	22	3	1			2	1		2		3
Nogales, Ariz	7,675	4	72	2		78	70	1	1		1	1			1		
Norfolk, Va	156	2	3	1	2	8		1	1						1		1
Oroville, Wash	250			5	9	14							1				
Pascagoula, Miss	6																
Perth Amboy, N. J	11																
Philadelphia, Pa	289	1	2	3		6	2		1				1				
Philadelphia, (Pa.) quarantine	155		2	3		5	2										
Philippine Islands	4,124	51		4	2	57	51							1			1
Ponce, P. R	120	2	2			4	1			1			1		1		
Portal, N. Dak	894	18	3	13	5	39	2	6	5	1			1		1		
Port Arthur, Tex	98	1	8	2		11	2		1						3		3
Port Huron, Mich	4,020	44	24	435	122	625	12	4	12		3	4	21			1	9
Portland (Me.) quarantine	45				2	2											
Portland, Oreg	23	2	1			3			1				1				
Port Tampa, Fla	3,224	2				2											
Port Towsend, Wash	16,169	1	161	76		238	20	1	1						4		4
Providence, R. I	4,476	1	3	54	26	84	3				1						
Quebec, Canada	1,018	2		4	2	8							2				
St. John, N. B	1,807	9		101		110		3	3				3				
San Diego, Cal	845																
San Francisco, Cal	15,099	9	498	124	297	928	25	2	5			2			8		9
San Juan, P. R	3,021	2	6	13	9	30	4	1				1	1		1		1
Sault Ste. Marie, Mich	2,158	5	8	43	62	118	1	1	1			1		2	1		1
Savannah, Ga	21		2	1		3	1								1		
Seattle, Wash	4,833	3	278	36	31	348	16	1	2								
Sumas, Wash	1,120	14	31	63		108	29	1	6			2	5				
Tacoma, Wash	386		1			1	1										
Tampa Bay (Fla.) quarantine	3,588		8	2		10	1								1		4
Tia Juana, Cal	3,899			1		1											
Tuscon, Ariz	150	11	27	3		41	5	1	6				5		11		10
Vancouver, B. C	4,658	13	79	74	38	204	44	1	3			1	4				1
Victoria, B. C	3,456	6	1	7	29	43		3					3				1
West St. John, N. B	128			1		1											
Wilmington, N. C	31		1			1											1
Winnipeg, Canada	9,532	21	7	602	110	740		18	2			6	2				
Yarmouth, N. S	25,005	12		38	12	62		1	1				2				
Pensacola, Fla	14	3	1			4		1	1								1
Humacao, P. R	1																
Brunswick, Ga	1			1		1									1		
Total	481,270	815	2,593	9,586	3,336	16,327	920	239	157	16	23	50	327	22	100	20	143

MEDICAL INSPECTION OF IMMIGRANTS.

BALTIMORE, MD.

Surg. J. A. Nydegger, in charge, reports as follows:

Owing to the continuation of the European war since August, 1914, the immigration at this port, which previously amounted to 45,000 annually, has been reduced to less than 200.

Fourteen hundred and eighteen vessels subject to immigration inspection arrived at this port during the year, with a total of 178 passengers (steerage 115, cabin 63).

There were 178 aliens examined upon arrival. In addition to this number 35 were passed by the immigrant authorities as United States citizens. One hundred and forty-eight foreign seamen were also examined, not included in the above, and special certificates as to their physical condition or otherwise were issued in the case of 13.

There were 20 regular certificates rendered during the year for various diseases and physical defects as follows:

Class (A) 2. Dangerous or loathsome contagious disease:	
Gonnorrhea	5
Syphilis	3
Class (B). Disease or defect affecting ability to earn a living	12

No aliens were admitted to hospital during the year, and likewise no deaths occurred. Hospital treatment in case of 4 foreign sailors, referred for medical advice, was advised.

No cases of feeble-minded or other abnormal mental conditions were detected in the aliens and foreign seamen examined.

The construction of the hospital, connected with the new immigration station, at Fort McHenry, is now well under way. The building, a three-story one with basement and recreation roof, contains 14 wards, with bed capacity for 60 patients.

BOSTON, MASS.

Acting Asst. Surg. M. Victor Safford, in charge, reports as follows:

During the year 1,226 vessels arrived at Boston from foreign ports. Although the number of those found to have aliens aboard requiring a medical examination under the immigration laws was only 206, the lack of advance information regarding arriving ships made it necessary to have the boarding boat covered continuously by a medical officer to meet all incoming ships.

The immigration at Boston during the year was derived chiefly from countries bordering on the Mediterranean and from Portugal and Portuguese possessions, but ships with at least a few passengers aboard arrived from all parts of the world except Germany, Austro-Hungary, and Turkey. An interesting feature of the year was a small but regular immigration from South Africa.

The primary inspection of alien cabin passengers was, as a rule, conducted on shipboard; the primary inspection of any considerable steerage passengers was made as usual on shore, and during this year exclusively at the new commonwealth pier. The type of people encountered as cabin passengers is indicated by tables No. 1 and No. 2, wherein it appears that 25 per cent of those classified as second cabin were certified as diseased or defective, as compared with approximately 9 per cent in the case of steerage passengers.[1]

Table No. 1.

Class.	Number of citizens.	Number of aliens.	Total passengers.	Proportion of United States citizens.
				Per cent.
First cabin	276	425	701	39⅓
Second cabin	324	1,579	1,903	17
Steerage	591	11,639	12,230	4⅚
Stowaways	6	71	77	8
Total	1,197	13,714	14,911	8⅓

Table No. 2.

Classification on shipboard.	Number of alien arrivals.	Class A and B certificates.	Class C certificates.	Total.	Ratio certified.
First-cabin aliens	425	3	7	10	1:42
Second-cabin aliens	1,579	125	249	374	1:4
Steerage aliens	11,639	273	746	1,019	1:11
Stowaway aliens	71	11	6	17	1:4
Total	13,714	412	1,008	1,420	1:10

In accordance with the agreements resulting from the steps taken by the commissioner of immigration at New York to secure a better inspection and examination of alien cabin passengers, the representatives of the transportation companies at Boston have conferred with the medical officers in trying to devise facilities for making a satisfactory inspection of cabin passengers on shipboard, but combined efforts in this direction can not as yet be regarded as successful. As a matter of fact, even in the case of the steerage passengers, local facilities and methods which have hitherto worked smoothly and successfully in handling the primary medical inspections and examinations have proved inadequate to provide satisfactorily for the increased proportion of obvious defectives encountered in the present immigration. To meet present and prospective demands, plans are now prepared for remodeling and increasing the accommodations for medical examination purposes at the commonwealth pier, although the present arrangements there when provided three years ago were thought to make ample provision to meet any requirements which were likely to arise.

The percentage of steerage passengers receiving medical certificates this year was over 9, or practically twice as great as ever before at this port. No attempt has been made to keep count of the number of aliens whom on primary inspection it has been deemed necessary to turn aside for medical examinations. It has not been undertaken to make complete examinations of aliens except those who on primary medical inspection presented indications of abnormality, yet on one occasion at least 40 per cent of an approximate total of 300 cabin passengers were turned aside for such examinations, and it is safe to say the same proportion has been closely approached in cases of ships with approximately 1,500 steerage passengers. The records of the office show that during the year of those turned aside on primary medical inspection 870 were held for more thorough examinations than could be completed on the day of the arrival of the ship and that of these so held 395, or nearly one-half, eventually received medical certificates.

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[1] Defects regarded as of no practical importance are not counted as certificate cases.

For diagnostic assistance the medical officers are continuing to utilize the nine different hospitals with which arrangements exist for the treatment or examination of arriving aliens. During the year the practice has been continued of having Wassermann and stool examinations made of every alien sent to hospital, whatever the reason for which he may be sent. Also during the year an increasing amount of laboratory work particularly with reference to blood has been done at the immigration detention station itself. As a net result of the work of the medical officers at Boston for the year, 1,420 arriving aliens were certified as being physically or mentally defective or diseased, or over 10 per cent of all arriving aliens, there being included in the total the first-class alien tourist travel.

Physical disabilities which disqualified the individuals concerned for military service and made their emigration possible were naturally an important factor in augmenting medical certificate cases and reference to the detailed tabulation of conditions certified would indicate that abnormalities and defects incident to a defective physical development predominate as a cause for medical certification rather than actual diseases or their results.

The number of arriving aliens sent to outside hospitals was 224. These cases were made up to a great extent of detained aliens who became sick during a protracted stay at the immigration detention station. As usual, the surveillance over the cases in the various hospitals where they were distributed claimed a considerable part of the time of the medical officers. The Boston Psychopathic Hospital has been continued to be utilized to advantage during the year as a means of independent confirmation in the examination of mental suspects.

In addition to cases removed to hospitals it was found advisable to maintain intermittently, as during the preceding year, a small hospital service and to conduct daily a regular dispensary service at the immigration detention station itself. The problem of securing proper artificial feeding of young infants detained at the station for long periods has also constantly claimed the time and attention of the medical officers, but as the matrons are becoming better trained this problem is tending to become less difficult.

The detention station has at times during the year been crowded in excess of its sleeping capacity, but for the greater part of the time the average number of the detained aliens has been materially less than during the preceding year. There have been no outbreaks of serious contagious diseases at the station during the year, and on the whole the health of the station has given the medical officers less cause for concern, but the morbidity among the inmates has not been appreciably less than during the preceding year. Early in the year the station was equipped with a 42 inch by 48 inch by 96 inch steam sterilizer with formaldehyde attachment, and this apparatus together with improvements in bathing and washing facilities, have made it possible to keep the inmates of the detention quarters free from lice, except for a time immediately following the arrival of a ship bringing a large number of newcomers into the station.

By leasing additional space at the beginning of the year the Commissioner of Immigration has been able to provide the medical officers with much needed additional room for office, laboratory, and mental examination purposes at the immigration station. Besides furnishing interpreters, the commissioner is now furnishing this service with an extra clerk and two others of his employees to act as attendants whenever a ship with any considerable number of passengers arrives. These official assistants are additional to the stewards, sailors, or employees of the company regularly detailed to assist in the medical inspection on the arrival of a ship. The commissioner has found it advisable to furnish the service this official assistance to expedite the medical work and enable the immigration examination itself to proceed with the expedition with which the immigration force is prepared to handle it. Through the commissioner also it has been made possible to secure trained laboratory assistance at the immigration station at times during the year.

LANDED CASES.

There appears below a tabulation of cases of aliens alleged to be in the country in violation of law, and referred by State or municipal officials to the United States Commissioner of Immigration at Boston during the year, to be disposed of.

Table No. 3.

Causes.	Warrant of arrest.				Deportation.	
	Applied for.	Issued.	Served.	Canceled.	Issued.	Canceled.
Imbeciles	4	4	4		4	
Feeble-minded	8	8	8	2	7	
Epileptics					1	
Insane, within 5 years two or more attacks.	110	113	120	6	114	3
Tuberculosis	23	20	19	6	12	3
Trachoma						
Other LCD or DCD	8	8	6	2	3	1
Professional beggars	1	1	1		1	
Paupers						
Likely to become public charges at the time of entry	103	105	103	26	80	6
Contract-laborers	25	25	21	25	17	19
Under 16, unaccompanied by parent	5	5	3	2	3	1
Criminals	15	16	12	2	9	
Polygamists						
Anarchists						
Prostitutes and other immoral women	23	23	20	9	15	
Procurers and all immoral men	17	17	14	5	10	
Other causes	115	111	88	38	52	4
Total	457	456	419	123	328	37

This table includes only such cases as were regularly taken up and disposed of through the Boston immigration office and does not comprise all alien public charge cases which in one way or another may have come to the attention of the office. Every other immigration office in the country is called on annually to handle similar cases.

Less than one-third of the cases referred to in the table originally landed at Boston. To a greater extent than appears at first sight this table furnishes an index to the efficiency of the medical examination of arriving aliens. In such cases as are tabulated above it has come to be regarded as a part of the regular duties of the medical officers of the station to investigate claims of "prior causes" when physical or mental disability is involved. In nearly all the cases in which warrants were issued on the ground of "likely to become a public charge at the time of entry," some disease or disability undetected at the time of arrival furnished the basis for the issuance of the warrant. Even in the cases of those arrested as prostitutes feeblemindedness was usually demonstrable after arrest.

A very few of the cases appearing in the above table received medical certificates at the time of their entry, and so far as the medical cases in the table are concerned the number of canceled warrants approximately represents the number of cases in which prior disabilities could not be established. Not all these disabilities could, of course, have been detected at the time of arrival, but it seems safe to say that there is an average of about a case a day of an alien reported to the Boston immigration office as unlawfully in the country by reason of some physical or mental condition which was not detected at the time of entry and which would have been disclosed by such a medical examination of arriving aliens as it is entirely practicable to maintain.

One specific phase of the shortcomings of the medical examination of arriving aliens that has been brought to the attention of the Boston office during the year is the frequency with which aliens become dependents by reason of defects of eyesight which may not be detected or the serious importance of which may not receive sufficient attention at the time of arrival. The importance of this matter has been deemed sufficient to warrant the preparation of a special report by Acting Asst. Surg. Riemer, which is hereto appended.

Sufficient appropriation now seems in sight for the erection of a new immigration station on the site in East Boston which has been available for this purpose for several years, and it is expected that building operations will begin in the near future.

The officers of the service at Boston have continued to receive during the year in the conduct of their duties the intelligent cooperation and assistance of Commissioner Skeffington, Deputy Commissioner Hurley, and of all the other immigration officers at the station. I also wish to take the opportunity to commend to the bureau for continued efficient and faithful services Acting Asst. Surgs. Riemer and Nute and Clerk O'Neil.

The report prepared by Acting Asst. Surg. Riemer on defective vision as related to immigration examinations is as follows:

DEFECTIVE VISION.

At Boston a great deal of thought and attention is now given to the problem of detecting arriving aliens seriously handicapped by defective vision. If time were allowed to make a vision test of each individual, the problem would naturally solve itself, but to test each one is not practical and neither is it necessary.

In the examination of 13,714 aliens during the past fiscal year, 132 aliens were certified as having defective vision. Classified they are as follows:

Class B, 21 having very defective vision.
Class B, 21 where defective vision accompanied other disabilities.
Class C, 24 having defective vision.
Class C, 66 where defective vision accompanied other disabilities.

This represents less than one per cent (0.96 per cent) of arriving aliens who were certified as having defective vision. Surg. J. W. Schereschewsky, in the examination of 3,086 garment workers in New York City, showed that 69 per cent had defective vision. When it is considered that serious defective vision is rarely an acquired condition, but usually congenital, there is cause to wonder whether or not as many are detected as should be.

The importance of detecting cases of defective vision from an economic standpoint can not be too greatly emphasized. It will be interesting to note in this connection the careful analysis of 816 cases of myopia (nearsight) treated for the first time at the Massachusetts Charitable Eye and Ear Infirmary from January 1, 1915, to January 1, 1916, made by Miss Harriet Gage, under the direction of Dr. George S. Derby.

Classified according to nationality they are as follows:

American	223	Armenian	8
Hebrew	202	Greek	7
Irish	166	Finnish	4
Italian	60	Turkish	3
Canadian	26	Syrian	2
English	25	Russian	2
German	20	Austrian	2
Scotch	19	African	1
French	15	Bohemian	1
Scandinavian	10	Danish	1
Polish	9	Chinese	1
Portuguese	9		

This hospital has the largest eye clinic of any hospital in the State. It is located in the west end of Boston, a locality inhabited chiefly by foreigners, yet this does not entirely explain the large percentage of foreign born in the list, as this hospital is so well known throughout New England that patients come for treatment from practically all these States.

It is well known that myopia is one of the most serious eye defects and is usually a progressive condition accompanied by degenerative changes in the seeing parts of the eye, often leading to serious incapacity and total blindness. In the State of Massachusetts the commission for the blind requests a report of all cases whose vision is seriously impaired, and especially the progressive cases. The commission believes vision of 20/70 to 20/200 indicates handicap so far as " fine work " is concerned. Vision of 20/200 indicates the " borderline cases," and vision less than 20/200 indicates "practical" or "total" blindness. The commission regards such impairment of vision as a real handicap and consequently makes an investigation of all such reported.

Miss Gage found 257 of the 816 cases studied at the Massachusetts Charitable Eye and Ear Infirmary as reportable to the commission. One hundred and eleven of these cases were males, 67 of them between the ages of 21 and 60, who under normal conditions would be wage earners, many of them with dependent families. Seventy-seven were females of the same ages.

A study was made of all eye cases of foreign birth treated at the Boston Dispensary from June 1, 1914, to January 1, 1915. This is the next largest eye clinic in Boston and is located in the south end of Boston, a section also largely inhabited by foreigners. It is estimated that 45 per cent of all patients treated in this institution are foreign born. From January 1, 1914, to January 1, 1915, 3,192 new eye patients were treated in the clinic of this institution, or approximately 718 foreign-born eye patients during a period of six months. This study included only those whose vision was less than 20/40 in each eye. The total number of such cases was 308, classified according to nationality as follows:

Hebrew	123	Scotch	4
Irish	39	Austrian	3
Italian	41	Greek	2
Canadian	26	Roumanian	2
Syrian	15	Belgian	2
English	12	Armenian	1
Scandinavian	6	French	1
German	5	Portuguese	1
Turkish	5		

The appended table shows the relative frequency of myopia, hypermetropia, and astygmatism, including under astygmatism all types, namely, simple myopic and hypermetropic, compound hypermetropic and myopic, and mixed. Astygmatism is by far the most frequent defect. Hypermetropia is second and myopia third. The small number of pathological findings is quite remarkable.

The purpose of this study was to determine if possible how many serious cases of defective vision passed the medical examination of arriving aliens without being detected and who after landing sought treatment, also to determine the relative frequency of defective vision in the various races.

The analysis made by Miss Gage, as well as the cases studied at the Boston Dispensary, certainly shows that Hebrews stand first in defective vision, Irish second, and Italians third. The fact that Hebrews stand first is well known, but it is not believed that it is so commonly known that defective vision is so frequent among the Irish and Italians.

The burden of detecting these cases falls on the medical officers making the line or primary inspection. This officer is obliged to work rapidly and must make his decision quickly as to the fitness of the alien to pass on. It requires, therefore, an officer who has had a large experience in this kind of work; a man whose power of observation is most keen and whose eyesight is perfect. Only such a man can do the work efficiently.

Factors which materially assist an officer doing this work are good light, preferably daylight, proper arrangement of attendants who control the conduct of the alien coming up for inspection. At Boston it is regarded that the proper spacing of the immigrants who are being inspected is one of the most essential features of the examination. The alien should be caused to walk alone toward the medical officer for a distance of at least 20 feet, and the attendant should never allow the next person to proceed until the officer has passed the first man along. It gives the inspecting medical officer a great advantage to always have a free space of 30 feet. He then can follow the alien this whole distance without any obstruction.

The defective vision cases, often mistaken for mental cases, when obliged to walk alone, seem to lose their poise. They become uneasy, and instead of looking ahead they usually look at the floor directly in front of them. In other words, the inspecting officer usually has some clue as to the individual's vision before he has walked 30 feet.

At Boston it is the practice to turn aside for further medical examination each suspected case of defective vision, all blind in one eye, every case with defective cornea or lens, and the examination is never completed without making a careful vision test and fundus examination of all those turned aside.

SUMMARY.

Defective vision is a very common defect in the immigrant. Hebrews, Irish, and Italians lead the other races in defective vision. Many cases are seriously handicapped and totally incapacitated from defective vision. The line inspection should always be made by an experienced and competent medical officer. It is important to have a proper arrangement of attendants who control the conduct of aliens during inspection.

Table showing the relative frequency of myopia, hypermetropia, and astygmatism, including under astygmatism simple myopic and hypermetropic, compound hypermetropic and myopic and mixed, for a period of six months, eye clinic, Boston Dispensary.

Race.[1]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total.
Myopia:																		
Corrected	5	2	1	1	....	....	....	1	....	1	....	....	....	....	....	....	....	11
Partly corrected	15	3	1	2	2	2	....	1	1	....	2	....	....	....	....	....	1	30
Hyperopia:																		
Corrected	4	9	4	1	1	1	....	....	....	....	....	1	1	....	....	....	....	22
Partly corrected	15	8	7	4	2	2	2	1	....	1	....	....	....	....	....	....	....	42
Astygmatism:																		
Corrected	7	4	1	....	1	....	1	....	1	....	....	....	....	....	....	1	....	16
Partly corrected	61	22	18	14	5	2	1	2	3	2	....	....	1	....	....	....	....	131
Media:																		
Defective cornea	7	6	6	1	3	3	1	....	....	....	....	....	....	1	....	....	....	28
Defective lens	6	2	....	3	....	2	....	....	....	....	....	....	....	1	....	....	....	14
Defective vitreous	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Disease fundus:																		
Optic nerve	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2
Retina	1	1	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	4
Choroid	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Conjunctiva:																		
Chronic inflammation	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Trachoma	1	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	4
Iritis	1	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....	....	4
Total	123	59	41	26	15	12	6	5	5	4	3	2	2	2	1	1	1	308

[1] Numbers 1 to 17 indicate races as follows:

1, Hebrew.
2, Irish.
3, Italians.
4, Canadian.
5, Syrian.
6, English.
7, Scandinavian.
8, German.
9, Turkish.
10, Scotch.
11, Austrian.
12, Greek.
13, Roumanian.
14, Belgian.
15, Armenian.
16, French.
17, Portuguese.

The above table includes only those cases whose vision was less than 20/40 in each eye.

CALEXICO, CAL.

Acting Asst. Surg. F. Cauthorn reports as follows: There were 447 inspections made at this port of entry during the year. Of these, 17 were debarred. The debarments consisted of one case each of melancholia and imbecility, five of tuberculosis, seven cases of venereal disease; and one each of trachoma, paralysis, and leprosy, the latter disease occurring in a Mexican. The principal work of the office consisted of the examination of Mexican laborers.

DEL RIO, TEX.

Acting Asst. Surg. H. B. Ross reports as follows: The International Ferry, where aliens land, is situated about 3½ miles from Del Rio, where practically all examinations are made. The conditions in Mexico have been very much disturbed and immigration has been reduced and the traffic irregular. Many of the people are now returning to their homes and, if nothing further happens to disturb them, the adjacent territory will soon return to normal.

During the past fiscal year there have been examined a total of 2,644 aliens. Of this number 36 were certified and deported, 33 having trachoma, 1 physically defective, 1 feeble-minded, and 1 had venereal disease. At present there is smallpox reported on the Mexican side and all people coming through this port are required to be vaccinated.

DETROIT, MICH.

Acting Asst. Surg. Kenneth L. Weber reports as follows: For the fiscal year ended June 30, 1916, there were examined at this port 7,784 aliens. This is an increase of 3,249 examined at this port over the preceding fiscal year and exceeds by 1,019 the number examined at this port during any previous fiscal year. Of the 7,784 aliens examined, 6,993 were passed and 791 were certified for disease or disability. Of the 791 certified, 280 were deported and 510 landed.

Aliens arrived at this port daily via 19 trains over 4 railroad lines, 2 ferryboat lines arriving every 10 minutes, and by lake passenger steamers.

In addition to the inspection of arriving aliens, the medical officer at this port renders medical aid to the United States immigration prisoners detained at the various hospitals, jails, and detention homes, and also examines aliens in and around Detroit who have become public charges to determine if their condition is a result of causes existing prior to landing in this country.

Aliens afflicted with trachoma are sometimes admitted to the United States under bond and are required to report to the medical officer until he pronounces them cured.

During the year there were six boards of medical officers convened for the reexamination of aliens, four at the request of the medical officer and two by bureau order.

DULUTH, MINN.

Acting Asst. Surg. E. L. Cheney reports as follows: During the fiscal year 132 boats arrived at the port of Duluth and 4,036 passengers were inspected. Of this number 30 were certified as having some disease or physical defect, 12 being deported, 20 passed, and 2 detained for future disposal, divided as follows: (Class A (I), 3; class A (II), 2; class B, 9; and class C, 16. The races represented were Irish 7, Scotch 5, Finnish 5, English 4, Greek 3, Scandinavian 2, Polish 1, Russian 1, German 1, Lithuanian 1. The European war has caused a marked diminution in the number of alien laborers from Canada, there being practically a total absence of Germans and Austrians.

EASTPORT, IDAHO.

Acting Asst. Surg. N. L. A. K. Slamberg, in charge, reports as follows:

Two thousand three hundred aliens have been examined, 200 have been certified, and 11 have been debarred. Of these 2 belong to Class A, 1; 2 to Class A, 2, and 7 to Class B.

In the course of the past year the Canadian Pacific Railroad Co. and the Spokane International Railroad Co. have altered their schedules; the night trains have been discontinued, and all passenger trains now leave and arrive during the day. This marks a distinct improvement, as in previous years the examination, particularly of ocular defects, was rendered difficult by the necessity of using artificial light.

EL PASO, TEX.

Acting Asst. Surg. J. W. Tappan reports that during the past year 26,244 aliens were examined at the immigration station. There were 15,008 vaccinations performed in the regular routine of immigration work. During the months of April, May, and June the temperatures of all immigrants were taken as a precautionary measure against typhus fever. In all, four cases were thus detected with fever. They were returned to Mexico, two of them afterwards having typical cases of typhus, the rash developing on the fourth day of their return. The other two had a mild febrile disturbance, which was not typhus, and from which they recovered in a few days. There were 190 certificates made for diseases or defects, physical or mental, as follows:

Under Class A (1): Insanity, 13; feeble-mindedness, 9; epilepsy, 4; pulmonary tuberculosis, 9.

Under Class A (2): Trachoma, 4; chanchroidal bubo, 3; syphilis, 4.

Under Class B, 144 certificates were rendered.

GALVESTON, TEX.

Surg. L. P. H. Bahrenburg, in charge of the medical inspection of arriving aliens, reports that during the fiscal year there was almost a complete cessation of immigration through the port of Galveston. The war in Europe stopped immigration from that source and the abnormal conditions in Mexico brought the usual passenger traffic from that country to a minimum. A total of 102 aliens were examined, including 53 passengers (all from Mexico), 40 crew, 2 deserters, and 7 stowaways. Seven certificates were issued, classified as follows:

Classification.

	On hand July 1, 1915.	Certified.	Total.	Deported.	Landed.	Remaining.
Class A (I)						
Class A (II)		2	2	2		
Class B	1	5	6	2	3	1
Class C						
Total	1	7	8	4	3	1

On August 16 and 17 a tropical hurricane visited the Gulf coast and caused considerable loss of life and property in and about Galveston. The immigration station was not severely damaged; the wharf and approach to the building was, in large degree, destroyed, but the building itself suffered little injury. In January, 1916, owing to the absence of telephone, telegraph, and electric connection with the city and the almost total cessation of alien passenger traffic, the station was closed, the offices being transferred to Galveston.

No aliens were admitted to hospital during the year for treatment or observation.

GLOUCESTER CITY, N. J.

Passed Asst. Surg. L. Schwartz reports as follows: Because of the European war, the regular lines of foreign passenger steamers have ceased to call at this port, and there arrived during the year only 289 immigrants, as compared with 8,293 that arrived last year. Most of these were from the West Indies. The few from European ports were shipped as crew on tramp steamers, and being paid off upon arrival here, paid the head tax and entered as immigrants. Amongst these immigrants 2 were certified as having trachoma and 1 as insane. There were 593 sailors examined, who were paid off and discharged from foreign vessels. Of these, 8 were certified as having trachoma, 7 as having syphilis, and 2 as having gonorrhea.

It has been found that many aliens who are refused passage by the regular steamship lines because they are afflicted with deportable diseases ship as crew on tramp steamers bound for this country, and upon arrival here desert the ship or demand to be paid off, stating that they wish to reship, and thus avoid coming under the immigration laws. It has also been found that many captains of tramp steamers have made it a business to ship such undesirables as crew or as extra crew and allow them to desert upon arrival at a United States port. For this the captains have received as much as $100 from each such alien shipped. There were 803 desertions from vessels at this port during the year. None of these deserters were examined for immigration purposes; and as they left their vessels without being paid off, it is reasonable to infer that there were a large number of undesirables amongst them.

To close this avenue for the ingress of undesirables, it is recommended that the crews of all vessels from foreign ports be examined, especially for the detection of trachoma, favus, and venereal disease, and certificates be issued when any are found diseased, stating whether the disease could have been detected by competent medical examination at the port of embarkation, and, if so, to impose the usual fine. At Philadelphia this examination could be more easily performed at the quarantine station than at Philadelphia. The piers are a long distance from the immigration office and by the time the medical officer would arrive at the distant pier any such intending deserters would have ample time to leave the ship. At the quarantine station, however, when the crew is mustered it is only a little extra duty to make such an examination, the quarantine officer issuing a certificate with notice to the captain to keep aboard and prevent the escape of such undesirables from the vessel under a penalty of the usual fine imposed in such cases.

From time to time these cases of trachoma which have been landed for treatment are examined at this office to see whether the disease is eradicated and treatment can be discontinued. There were 20 such cases under the observation of this office during the year and treatment was recommended to be discontinued in 3 of them because the lids were completely and permanently cicatrized. In the experience of this office, the treatment of trachoma either by grattage or the excision of the cartilage has given satisfactory results.

The aliens detained for various causes at the immigration station are cared for by the medical officer. During the year there were treated 193 cases. One child was born at the station.

HALIFAX, NOVA SCOTIA.

Acting Asst. Surg. T. W. P. Flinn reports as follows: No trans-Atlantic immigrants arrived, as the European war conditions affecting this port precluded any immigration. The passengers who arrived by the trans-Atlantic steamships were destined to Canada, mostly returning Canadians, the majority being returned soldiers.

The aliens examined were exclusively of the border class.

During the year 2,128 aliens were medically inspected, and of that number 73 were certified as mentally or physically defective. A fraction over 1 per cent were deported or returned to Canada, and of the 29 returned to Canada 4 were for diseases which, under the law, rendered their exclusion mandatory.

During the immigration season (from November to May), for some unaccountable reason, St. John was favored by having the steamships of the Allen and Canadian Pacific Railway Lines make that port their terminus to the exclusion of Halifax.

The port of Halifax, since the commencement of the war, has been largely used by the British and Canadian Governments as a rendezvous for the steamships of the transport service in carrying troops and munitions, etc., to England and the Continent.

It is probable that the noticeable increase of aliens of the border class was due largely to the action of the United States Immigration Service in notifying the public, through the press, of the advisability and the advantage to those aliens intending to enter the United States of presenting themselves at the United States immigration office here for examination, instead of at the border, and so avoid any annoyance, inconvenience, and expense that would follow if, for any reason, they would be held up at the border.

The above action was necessitated by aliens who had been rejected at the border coming to the office here and ventilating their grievances as to the expense and trouble they underwent.

It is the opinion of the medical officer in charge, after having some years' experience inspecting aliens of the border and trans-Atlantic classes, that the examination of the former is not, in many respects, as satisfactory as that of the latter.

The border class alien at times will refuse to submit to detention, showing disapproval, claiming it is an infringement on his or her personal liberty, and refusing to be a party to any further procedure, when in the judgment of the medical officer it is necessary to detain the alien either for more thorough examination or for observation, as facilities may not be afforded the medical examiner at the time the examination is made of allowing a proper medical certificate to be rendered.

HONOLULU, HAWAII.

A total of 4,077 immigrants were inspected at this port during the year ending June 30, 1916, and 172 were certified for diseases or disabilities in accordance with the immigration law. There was no Spanish or Portuguese immigration to Hawaii during the year. The vast majority of arriving aliens were Orientals, and almost all of these were Japanese. The distribution of the medical certificates according to nationality was as follows: Japanese—61, class A; 69, class B; and 16, class C; Chinese—9, class A; 8, class B; and 2, Class C; Koreans—3, class A; 1, class B; and 0, class C. The largest number of rejections was due to trachoma, and almost all of these were Japanese. The following are the districts from which aliens arrived from Japan who were found to be afflicted with trachoma, the figures in parenthesis representing the number of cases coming from the districts named: Kumamoto (9), Yamaguchi (9), Hiroshima (8), Niigata (2), Fukuoka (2), Fukushima (1), Kagawa (2).

During the year 3,943 aliens were examined for uncinariasis, and 19 were found to be afflicted with this disease, and 15 of these were Japanese coming from the following-named districts in Japan: Yamaguchi (4), Hiroshima (2), Niigata (2), Okinawa (2), Kobe (1), Tokyo (1), Hyozo (1), Nagano (1), Fukushima (1).

The number of aliens granted hospital treatment upon arrival here with a view to effecting a cure of the diseases and eventually permitting the cured aliens to land, was a few more than during the previous year. Nearly all of those furnished treatment were afflicted with uncinariasis, it being the policy of the immigration authorities to permit the treatment of these cases almost without exception. This policy, however, does not apply to aliens afflicted with trachoma and other dangerous or loathsome contagious diseases, such afflicted persons being deported as required by law.

During the year four fines of $100 each have been imposed against steamship companies for violations of the provisions of section 9 of the immigration law.

MARCUS, WASH.

Acting Asst. Surg. Thomas F. Parker has performed the regular routine of daily examination of aliens, and, as there is no detention hospital at this port, all deportable cases were returned to Canada same day as rejected.

SUMMARY.

Number of aliens examined	423
Number of aliens passed	358
Number of aliens certified	65
Number of aliens deported	26
Number of aliens admitted	397

There were 48 cases of class B, 17 cases of class C.

MONTREAL, CANADA.

Passed Asst. Surg. F. A. Asford reports as follows:

The work of examining immigrants presented to the medical officer was carried out as in previous years, the hours of duty being 9 a. m. to 1 p. m. and from 2 p. m. to 5 p. m. The European war has caused an increased number of transit aliens, as well as an increase in the number of those seeking employment in a country where the cost of living is less and the hope of employment is better. The Chinese immigration has fallen to a negligible quantity. A majority of the tuberculosis cases, after being rejected according to the forms of law, were admitted under bond as coming for treatment only and not for permanent residence.

NACO, ARIZ.

Acting Asst. Surg. B. C. Tarbell reports as follows:

There were 4,931 aliens examined, of whom 4,888 were passed and 44 certified and 43 debarred for mental or physical defects, as follows:

Under class A (1): Insanity, 2; epilepsy, 4; feeble-minded, 1.

Under class A (11): Loathsome contagious diseases, 8; gonorrhea, 2; syphilis, 6.

Dangerous contagious disease, 26 (trachoma).

Under class B: Two certificates were issued with two deportations—blindness, 1; paralysis, 1.

Under Class C: One certificate was issued and alien allowed to enter—cataract, 1.

The increase of aliens applying for admission at this port for the fiscal year just ended, over the proceeding year, of almost 2,000 aliens is partly due to the unsettled conditions existing in Mexico and also to the increased activity of the mining business in this State.

During the past year the train service into Naco has been so frequently interrupted that travel has mostly been made by wagon or automobile, arriving at all hours during the day, making it impossible to have fixed hours for the medical examination of aliens. This is met and overcome by the medical examiner being at the immigration station continually from 8.30 a. m. to 6 p. m.

NEW ORLEANS, LA.

Acting Asst. Surg. J. T. Scott reports as follows:

Mexico continues to give us back from time to time some of our own citizens as refugees. These people are usually destitute or nearly so, and many of them require almost constant medical attention while detained at the immigration station before being sent to their homes.

Quite a few deserting seamen and an occasional stowaway is found to be afflicted with a dangerous contagious or loathsome contagious disease and detained at the immigration station until deported. These cases require daily attention, as they are really hospital cases and should be sent to some hospital for treatment, as there are no hospital facilities at the immigration station.

NEWPORT, OREG.

Acting Asst. Surg. W. C. Belt. No transactions.

NEW YORK, N. Y.

Senior Surg. J. C. Perry, in charge, reports as follows:

General.—Additional space has been provided for the medical division and adequate quarters now exist for satisfactorily handling this work when an increase in immigration occurs. The increased provisions consist of another reception room, two rooms for secondary mental examinations, a new staff room, and two additional ones for physical work. The room used in conducting the mental examination of aliens has already been equipped, the staff room will be ready for occupancy at an early date, and then a room will be available for proper preservation of records.

Medical examination.—The work performed at this station in the medical examination of arriving aliens is naturally divided as follows:

(*a*) Boarding division: The examination of first and second cabin passengers on board arriving vessels.

(*b*) Line inspection: Primary medical inspection and secondary examination of aliens for physical defects and mental deficiency.

(*c*) Hospital division: For the treatment of diseased aliens.

(*d*) Clerical division.

Owing to the difficulty of satisfactorily examining aliens on board vessels in all instances on account of inadequate light and insufficient room, the feasibility of requiring all second-cabin passengers to be landed at Ellis Island for the purpose of inspection was taken under consideration, and as a result of several conferences between the representatives of the steamship companies and officials of the Immigration and United States Public Health Services certain minimum requirements were made, and in this connection it may be stated that as a result of this agitation marked improvement has taken place on most of the vessels in providing adequate light and proper facilities for the proper examination of passengers.

The immigration during the year has been comparatively small, owing to the disturbed conditions in Europe, and this has made possible a continuation of a larger percentage of intensive examinations, and the result of this procedure, in finding physical defects which would not have been ordinarily detected by the line inspection, shows the desirability of the more thorough examinations now being made. It is believed that this practice has resulted in so much good that the procedure has become an established one, and that when immigration resumes a normal flow an additional number of officers will be necessary to conduct the examinations as now carried out. This would seem to be especially so after the war, on account of the probability that a large number of the immigrants seeking admission to the

United States will be of a class requiring intensive study in order to safeguard this country.

The number of arriving aliens shows a further decrease, and the total number arriving during the year was 176,461, which shows a loss over the preceding year of 66,261. The percentage of certificates from all causes was 3.30 per cent.

Special attention has been paid to the examination of aliens for mental deficiency, and the number of certificates issued for this class was 1.18 per cent. This percentage shows a slightly lower ratio than that for the preceding year, which was 1.35 per cent, but this is probably due to a lesser number of immigrants from districts in which aliens might show a fair percentage of those mentally deficient. The proportion of certificates for insanity exceeds that of the preceding year and was 0.30 per cent, which is the highest in the history of this station. The previous high record being for the year 1915, 0.22 per cent.

Hospitals.—The total number admitted to the hospitals during the year was 6,303, an increase over that of the previous year. This number can be divided as follows: Immigrant general hospital, 4,226; contagious-disease hospital, 2,077. This shows a marked increase in the number of admissions to the contagious-disease hospital, which is partly explained by the fact that all suspected cases of tuberculosis and children under 12 years of age suffering from fever are now sent to the contagious-disease hospital instead of to the immigrant general hospital. This practice has resulted in preventing secondary cases of communicable diseases developing in latter hospital and has proven to be a wise procedure. However, a large number of patients suffering from communicable diseases have received treatment in the contagious-disease hospital during the year, and the results accomplished in it make a very creditable showing and are such as to compare favorably with those in any similar institution.

Owing to the European war, it has been impossible to deport a number of aliens suffering with excludable diseases, and therefore a number of operations have been performed for trachoma and ringworm of the nails in order to provide some relief. Operations were performed on 64 cases of trachoma, with recovery in 56 cases and improvement in 8. There were also 28 cases of tinea unguium cured by operation. Other operations that may be noted were 6 for mastoiditis, with 5 recoveries and 1 death.

Laboratory.—During the year the bacteriological laboratory has been enlarged by the addition of another room and has been further equipped with proper shelving and necessary sinks. It now occupies the entire floor over the administrative offices of the contagious-disease hospital. A number of reference books have been added and a small library accumulated; file cases have been installed and records systematized, so that the laboratory is amply equipped for ordinary work and could be easily expanded to meet unusual conditions and carry on research work within limitations.

The amount of work has materially increased over the preceding year, and it has been necessary to detail an officer as assistant bacteriologist and to employ a laboratory attendant. The total number of specimens examined during the year was 5,216, whereas the number in the preceding year was only 1,223.

On account of large amount of routine work, time has not been available for much new investigative work, although some studies have been made on the meningococcus and the *M. catarrhalis*, and investigations along these lines are still being carried on.

On account of abundant material and adequate facilities for intensive work, the advisability of making studies on scarlet fever and other communicable diseases may be suggested. In order to effect this it will be necessary to have sufficient assistance for ordinary routine work so that a special worker could devote all his time to intensive studies.

During the year the examinations for Wassermann reactions of patients in the service hospital at Stapleton were taken over by this laboratory.

The work accomplished is best shown in the following tabulated statement:

Specimens of urine examined	774
Sputums examined for tubercle bacilli	440
Throat cultures examined for diphtheria	1,414
Vaginal smears examined for gonococcus	559
Blood examinations made (smears, cultures, counts, etc.)	171
Examinations, nails, scalp and skin, favus and ringworm	280
Stools examined for hookworm and helminths or ova	190
Examinations, nasal and other smears, for leprosy	15
Widal reactions for typhoid	19
Spinal fluids examined and cultured for meningococcus, cell counts, globulin, etc	12
Autogenous vaccines prepared	14
Tissues sectioned and examined	6
Miscellaneous specimens examined	48
	3,942

Wassermann (Noguchi) reactions done (total number)	1,035
Total positives or partial positives	240
Total negatives	795
Total reexaminations, positive or partial positive	86
Total reexaminations, negative	29

Wassermann's (Noguchi) done for marine hospital at Stapleton:	
Total	123
Total negative	85
Total positive or partial positive	38
Reexaminations, negative	1
Total specimens of all kinds examined during the year	5,216

Anthropometric measurements.—During the year 278 anthropometric measurements have been made, and in the course of another 12 months, if more time can be devoted to this work, a sufficient number of cases will have been examined to justify the tabulation of results according to nationalities. This part of the work has been seriously handicapped on account of the officer trained in this line of work having been unable to devote much time to it on account of having to perform regular duties of line inspection and physical examination of arriving aliens.

Advantage has been taken of the facilities offered by the Institute of Psychiatry, Wards Island, N. Y., and two medical officers have been detailed for service in that institution during the year. Both the director and the superintendent of the institute have extended many courtesies and the officers have been given instruction and training in a class of studies that eminently fits them for work at Ellis Island in conducting examinations to detect mental deficiency as well as obscure mental conditions.

The work accomplished during the year is best presented in the following tabulated form:

Passengers arrived at New York from foreign ports.

Aliens in cabin	75,055
Aliens in steerage	101,406
Total aliens	176,461
Citizens (cabin)	41,924
Citizens (steerage)	6,811
Total citizens	48,735
Grand total, aliens and citizens	225,196

Medical certificates.

Class A (1), including 5 idiots, 9 imbeciles, 54 insane, 192 feeble-minded, 4 epileptics, 36 aliens certified for tuberculosis	300
Class A (2), loathsome contagious or dangerous contagious	496
Class B, disease or defect which affects ability to earn a living	4,816
Class C, diseases or defects of less degree	225

Disposition of immigrants certified.

Class A (1):	
Cases pending at beginning of year	40
Cases certified during year	300
Total to be accounted for	340
Cases deported	228
Cases landed	60
Cases pending close of year	52
Class A (2):	
Cases pending beginning of year	78
Cases certified during year	496
Total to be accounted for	574
Cases deported	384
Cases landed	167
Cases pending close of year	23
Class B:	
Cases pending beginning of year	64
Cases certified during year	4,816
Total to be accounted for	4,880
Cases deported	991
Cases landed	3,851
Cases pending close of year	38
Class C:	
Cases pending beginning of year	1
Cases certified during year	225
Total to be accounted for	226
Cases deported	13
Cases landed	213

Races of immigrants deported on medical certificates during fiscal year ending June 30, 1916.

Race.	Men.	Women.	Children.		Total.
			Male.	Female.	
African, black	55	32	1	1	89
Armenian	24				24
Arabian	8				8
Albanian	66	2	1		69
Bulgarian	7				7
Bohemian	1				1
Brazilian	1				1
Colombian (Indian)	1				1
Cuban	6				6
Chinese	12				12
Dutch and Flemish	11	2			13
English	35	12		1	48
French	8	3			11
Finnish	24	9	1		34
Greek	432	40	6	2	480
German	6	2	1		9
Hebrew	23	10	2		35
Irish	46	39		5	90
Italian	297	82	12	7	398
Maltese	2				2
Macedonian	30				30
Montenegrin	1				1
Mexican		1			1
Peruvian	1				1
Portuguese	39	5			44
Polish	4	8		1	13
Ruthenian		1			1
Russian	5	3			8
Roumanian	5	1			6
Syrian	18	3			21
Spanish	85	4		1	90
Servian	2				2
Scotch	9	1			10
Scandinavian	26	16	1	1	44
Turkish	4				4
Welsh	2				2
Total	1,296	276	25	19	1,616

Hospital cases.—In the two immigrant hospitals there were treated during the fiscal year 6,495 cases.

Immigrant hospital (general):

Remaining at beginning of year	166
Admitted during year, including 6 born in hospital	4,226
Total to be accounted for	4,392
Discharged	4,310
Died	20
Remaining at close of year	82

Immigrant hospital (contagious disease):

Remaining at beginning of year	26
Admitted during year	2,077
Total to be accounted for	2,103
Discharged	2,066
Died	48
Remaining at close of year	37

Upon the request of the commissioner of immigration medical officers visited 121 aliens who had become public charges or inmates of various institutions in New York and the vicinity and examined them to determine the nature of the disease or defect, and to ascertain whether due to causes existing prior to landing.

Summary of hospital transactions at Ellis Island.

Number of patients in hospital at beginning of year	192
Patients admitted to hospitals during year	6, 303
Total treated (men, 2,984; women, 1,868; male children, 843; female children, 800)	6, 495
Births (male, 6)	6
Deaths (men, 18; women, 10; male children, 20; female children, 20)	66
Pay patients treated during the year	6, 110
Free patients treated during the year	395
Days treatment for pay patients	58, 101
Days treatment for free patients	6, 835
Total days treatment for hospital cases	64, 936
Maximum number of patients in hospital at any one time during the year	269
Daily average number of patients in hospital	177
Patients in hospital at end of year	119
Immigrant hospitals:	
From previous year	192
Admitted during year	6, 303
Total treated	6, 495
Recovered	4, 759
Improved	431
Not improved	1, 118
Died	68
Remaining end of year	119
Days treatment	64, 936

Nativity and race of immigrants certified for trachoma during the fiscal year ending June 30, 1916.

Nativity.	African, black.	Algerian.	Albanian.	Arabian.	Armenian.	Chinese.	Dutch.	Egyptian.	English.	French.	Finnish.	Greek.	Hebrew.	Italian, south.	Irish.	Magyar.	Polish.	Portuguese.	Roumanian.	Russian.	Scandinavian.	Syrian.	Spanish.	Total.
Austria-Hungary																1	3		1					5
British								1																1
British West Indies	3																							3
China						9																		9
Canada										1			1											2
France		1																						1
Greece			1									105	1											107
Holland							1																	1
Italy														49										49
Morocco				6																				6
Norway																					1			1
Portugal																		2						2
Persia					1																			1
Russia											17		9				3			3		1		33
Roumania													1						1					2
South America																						1	1	2
Spain													1										20	21
Sweden																					1			1
Turkey					19							2	14									16		51
United Kingdom									1				3		1									5
Total	3	1	1	6	20	9	1	1	1	1	17	107	30	49	1	1	6	2	2	3	2	18	21	303

Races of aliens certified for mental conditions during fiscal year ending June 30, 1916.

Race.	Feeble-minded.	Imbecile.	Idiot.	Epilepsy.	Total.
Albanian	2				2
Bulgarian	6				6
English	5	1	1	1	8
French			1		1
Finnish	1	1			2
Greek	27		1		28
Hebrew	10				10
Italian, south	105	5		1	111
Irish	12				12
Indian	1				1
Magyar	1				1
Polish	2	1			3
Portuguese	9	1			10
Spanish	5		1	2	8
Scandinavian	5		1		6
United States born	1				1
Total	192	9	5	4	210

Causes of death.

Immigrant hospital:	
Hemiplegia	1
Pneumonia, lobar	10
Inflammation of stomach, acute	1
Edema, lungs	1
Senile debility	1
Endocarditis, infective	1
Positive Wasserman reaction, also tetanus	1
Insane	1
Broncho-pneumonia	2
Inflammation of maxillary sinus	1
Total	20

Contagious-disease hospital:	
Scarlet fever	10
Tuberculosis	7
Whooping cough	4
Measles	16
Diphtheria	2
Pneumonia, lobar	4
Cerebrospinal fever	3
Erysipelas	1
Organic disease of heart	1
Total	48

Analysis of the causes of death in measles, scarlet fever, and whooping cough.

Measles:	
Uncomplicated	1
Bronchitis	1
Scarlet fever	5
Otitis media	2
Broncho-pneumonia	5
Diphtheria	1
Meningitis	1
Total	16

Scarlet fever:	
Uncomplicated	2
Broncho-pneumonia	2

Scarlet fever.—Continued.	
Diphtheria	1
Measles	2
Otitis media	1
Nephritis	2
Total	10

Whooping cough:	
Broncho-pneumonia	2
Measles	2
Total	4

Deaths, by principal cause, any age, contagious-disease hospital, 1916.

Ages.	Under 1 year.	1 to 2 years.	2 to 3 years.	3 to 4 years.	4 to 5 years.	5 to 6 years.	6 to 7 years.	7 to 8 years.	8 to 9 years.	9 to 10 years.	10 to 11 years.	11 to 12 years.	12 to 13 years.	13 to 14 years.	14 to 15 years.	Over 15 years.	Total.
Measles	1	3	3	3	2	2	1	0	0	0	1	0	0	0	0	0	16
Scarlet fever	1	0	2	4	0	2	1	0	0	0	0	0	0	0	0	0	10
Diphtheria	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Whooping cough	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	4
Cerebrospinal meningitis	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	3
Erysipelas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Pneumonia, lobar	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Broncho-pneumonia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Organic disease of heart	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Pulmonary tuberculosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7
Total	5	5	8	7	3	5	4	0	0	0	1	0	1	0	0	9	48

Clerical work.

Permits and admissions record cards sent to hospital and filed in office upon admission of patients	25, 212
Notices to steamship companies upon admission of patients	1, 959
Certificates rendered of arriving aliens	5, 837
Certificates rendered of public-charge cases	157
Certificates rendered of infancy cases	162
Cases held for mental and physical examinations	3, 200
Receipts on hand for money and valuables ($8,575.58, 18 watches, 63 pieces of jewelry)	92
Receipts given patients for money and valuables held for safekeeping (in amount, $165,690; watches, 883; pieces of jewelry, 2,252)	3, 615
Receipts canceled in money and valuables returned to patients (in amount, $172,361; watches, 892; pieces of jewelry, 2,289)	3, 660
Receipts for money and valuables still on hand (in amount, $1,789.50; watches, 9; pieces of jewelry, 26)	47
Daily report of hospital transactions rendered to the commissioner of immigration and chiefs of divisions	2, 190
Reports of immigrants placed in hospital rendered to chief of registry division	572
Ship surgeon's reports of disease and injuries occurring among immigrants during voyage received and filed	572
Vouchers received and forwarded for payment	89
Checks received and forwarded	1, 868
Letters and telegrams received	2, 100
Letters and telegrams sent	2, 196

OROVILLE, WASH.

Acting Asst. Surg. Frank S. Beale reports as follows:

For the fiscal year ending June 30, 1915, 250 aliens were examined at this port. Of this number 17 were certified, of which 6 were deported and 11 landed.

The aliens arrive twice daily via trains, and also by wagon road in automobiles.

PHILIPPINE ISLANDS.

Surg. J. D. Long reports as follows:

In the Philippine Islands aliens desiring to enter are required to submit to the same medical inspections and under the same laws as are in force in continental United States ports. The immigration service is under the administration of the insular collector of customs acting as chief immigration officer. The medical officers of the United States Public Health Service detailed at the ports of entry as quarantine officers in addition to their quarantine duties carry out also the medical inspections of arriving aliens. A number of the excludable diseases from an immigration standpoint are not prevalent in the Philippine Islands, but a most fertile field exists for their introduction and spread, and consequently the importance of the medical inspections of arriving aliens is accordingly considerably augmented.

During the year there were 725 examinations made for the purpose of determining whether arriving aliens were afflicted with uncinariasis, commonly called hookworm, and of the number examined two resulted positive for hookworm and one positive for cholera organisms. Treatment was allowed those afflicted with uncinariasis and all in due time were enabled to land, having become apparently free from infection.

In the Philippines during the year there were 4,124 arriving immigrants inspected. Of these 57 were certified on account of having diseases, as follows: Trachoma, 51; favus, 2; eczema, 1; gonorrhea, 1; hernia, 1.

The arrivals by ports were as follows.: Manila, 3,188; Iloilo, 257; Cebu, 192; Jolo, 308; and Zamboanga, 179.

In conducting the immigrant medical examinations at the various ports in the Philippine Islands during the year ended December 31, 1915, the nationalities represented by the arriving aliens were as follows:

Races or peoples	Immigrant aliens.	Nonimmigrant aliens.	Total admitted.
Chinese	2,823	6,610	9,433
Dutch and Flemish	10	24	34
East Indian	60	59	119
English	101	283	384
French	6	21	27
German	17	26	43
Irish	2	5	7
Italian	8	41	49
Japanese	744	239	983
Portuguese	11	155	166
Russian	25	23	48
Scandinavian	5	4	9
Scotch	16	54	70
Spanish	204	280	484
Syrian	6	2	8
Turkish	1	2	3
Other peoples	28	29	57
Total	4,067	7,857	11,924

PENSACOLA, FLA.

Acting Asst. Surg. S. R. Mallory Kennedy reports as follows:

During the fiscal year ended June 30, 1916, a total of 14 immigrants were examined at the port of Pensacola, Fla., to determine their physical and mental fitness for entrance in the United States.

Of this number 10 were passed and 4 were certified for physical reasons. Of the 4 certified for physical reasons, 1 was certified for insanity, 1 for gonorrhea, 1 for tuberculosis, and 1 for soft chancres.

PORTAL, N. DAK.

Acting Asst. Surg. Arthur J. Somers reports as follows:

Aliens entering at this port are largely of the agricultural class, coming from the Provinces of Manitoba and Saskatchewan, and are almost universally of a strong, robust type, which in a great measure accounts for the apparently small percentage of certifications. During the fiscal year just ended there has been but little of what might be termed "European immigration."

PORT ARTHUR, TEX.

Acting Asst. Surg. W. S. Winter, jr., reports as follows:

Aliens arriving from foreign ports examined at Port Arthur, Sabine, Sabine Pass, Beaumont, and Orange, Tex., during the fiscal year ended June 30, 1916, numbered 98, of which there were 87 passed and 11 certified, great care being exercised to allow none but healthy subjects to enter the United States.

Passengers and crews of foreign ships entering the above-named ports are examined as soon as possible after the ship is docked, when the immigration inspector at this port so requests.

Following is a list of aliens certified during the fiscal year ended June 30, 1916:

Syphilis	3	Trachoma	2
Gonorrhea	3	Hernia	1
Insane	1	Senile	1

This port is growing very rapidly, having a population of over 20,000, and is sorely in need of some provision for the care of contagious diseases and a strict local quarantine.

During the past year there have been some difficulties in quarantining passengers and crews of vessels coming from foreign infected ports. Due to the fact that the vessels in question were freight carriers and were anxious to discharge and load cargo, the State quarantine officers would allow the vessels to come in port alongside the dock and load and unload their cargoes before period of quarantine had expired. This resulted in members of the crew going ashore, and passengers to scatter all over the country. During the past two or three months these quarantine conditions have improved somewhat, but still the vessels are making the same practice of not stopping at the State quarantine station at Sabine, Tex., but instead are only inspected by the State quarantine officer at Sabine and allowed to immediately proceed on their way inland to this port or some neighboring port to discharge and load cargo. In practicing this procedure the vessel in question is supposed to furnish guards to watch that no passengers or crew leave the vessel, but the guards are so slack in performing their duties that some of the passengers or crew are ashore practically all the time.

PORT HURON, MICH.

Acting Asst. Surg. George N. Kesl reports as follows:

During the year ending June 30, 1916, a greater number of aliens were examined by the medical examiner than in any previous year since the establishment of this station.

The duties of the acting assistant surgeon assigned to this port included the examination of arriving aliens, aliens detained on warrant, aliens who have entered the United States without legal inspection, and the medical care of all detained aliens.

Difficulties common to the land border and rare at seaports are encountered at Port Huron. Work is carried on seven days in the week and the number of hours during which the medical examiner must be prepared for duty or in the act of performing it are considerable.

Aliens arriving in the United States at or near this port are brought by the Grand Trunk Railroad, which operates eight trains daily into the United States from Canada. Aliens also are brought into the United States by numerous ferries operating on the St. Clair River between North Port Huron and Algonac, a distance of many miles. Each ferry in the course of the year furnishes its quota of aliens for examination. The largest ferry operates between Sarnia, Ontario, and Port Huron, this ferry line bringing 40,000 passengers every month to its dock in Port Huron.

PROVIDENCE, R. I.

Passed Asst. Surg. E. R. Marshall reports as follows:

Contrary to what might have been expected, the number of immigrants arriving at this port during the present fiscal year was increased by 32 per cent over the figures for the year 1915. It is interesting to note that fewer certifications were made this year than last, owing to the better physical condition of the arriving aliens.

During the latter part of the year the immigration examination has been conducted in the new quarters on the State pier. The arrangement and equipment for handling aliens at this port is now thoroughly up to date, with the exception of detention space for those who should be held for further medical examination. It can be said without fear of contradiction that the new quarters compare favorably with other immigration stations throughout the country.

Four thousand six hundred and nine passengers arrived during the fiscal year at the port of Providence; 4,479 of this total were aliens, of whom 86 were certified for disease or physical defect.

SAN FRANCISCO, CAL.

Surg. W. C. Billings, in charge, reports as follows:

The work of the medical division of the immigration station, Angel Island, Cal., for the fiscal year ending June 30, 1916, has been approximately the same in point of numbers as the work of the preceding year. There has been a slight falling off in the number of arriving aliens, due to various causes, which should not probably be taken as an indication of a definite permanent decrease in numbers. Less means of transportation has been afforded orientals for a greater part of the last fiscal year, but, with the renewal of transportation facilities, a greater number of arrivals is anticipated during the ensuing year.

Fifteen thousand and ninety-nine immigrants were inspected, and of these over 7,810 were brought to Angel Island for further and more extended examination. Of the number so brought practically all of the males were given a very thorough physical examination, including a microscopical examination of the intestinal discharge to determine the presence or absence of hookworm disease. Previous to the year just closed some few second and third cabin passengers were released directly from the vessel, but during the year 1916 all second and third cabin passengers were brought to Angel Island.

The number of certificates issued covering those diseases which come under the provisions of the immigration law was slightly less than last year, but so little less that the difference may be disregarded, and serves to illustrate the fact that the examinations have been placed upon a more systematic basis, with the result that probably very few aliens who should be certified escaped detection.

The custom of requiring microscopic examination of feces before departure from the Orient and the issuing to the alien by the doctor making the examination of a certificate stating that no hookworm ova have been found has been continued during the year, and in the opinion of the chief medical officer this method is the best that has yet been devised for meeting the conditions obtaining, but it has serious objections and is not by any means an entirely satisfactory way of handling the situation.

The number of certificates for trachoma, many of which certificates have carried a fine against the steamship company, has increased over the number of the previous year. It is difficult to understand why persons afflicted with advanced stages of this disease should continue to be brought to this country, inasmuch as a certificate stating that they are free from trachoma is furnished by local doctors before embarkation, and yet a considerable number of aliens arrive here with such evidence of the disease as to demonstrate conclusively that it must have been of long standing.

Beriberi still continues to present itself occasionally at this station. but during the last year all of the cases have been of the atrophic type and none have proved fatal. These cases have constituted an undesirable class from the standpoint of hospital management, inasmuch as their retention in the hospital usually covers such a very lengthy period of time, due, of course, to the inability of the medical officers to withdraw the certificate rendered against the alien until such time as an apparent cure is affected.

Generally speaking, the work of the medical division has run smoothly during the year and a desire for cooperation by both services involved has at all times been manifested.

Transactions at the immigration hospital for the year ended June 30, 1916, are as follows:

Number of immigrants in hospital on July 1, 1915	58
Admitted during the year	1,248
Total in hospital during the year	1,306
Recovered	1,097
Improved	59
Not improved	119
Deaths	2
In hospital on June 30, 1916	30

SEATTLE, WASH.

A larger number of immigrants were certified this year than in 1915, the addition being due mainly to the detention of more suspected cases of uncinariasis. A slight increase was also noted in trachoma. In the early part of 1916 a large number of Russian Hebrews began arriving at this port owing to the political unrest in their own country. The physical condition of some of these was not quite up to the standard, causing a material increase in Class B. A few of these were deported, others released under bonds, and one or two had the fault corrected by operation. One death occurred in a Japanese woman, aged 25, who died of acute Bright's disease based upon an old chronic condition of the kidneys. Following this event, all cases of uncinariasis have been subject to urinalyses. One other case of a child was found with acute nephritis, and, while treated for the hookworm infection, due regard was given to this kidney disability. A number of operations for hernia were performed among the Russian Jews.

In February of this year the new immigration building was occupied, the aliens now enjoying much more sanitary and commodious quarters. The part allotted females contains 1,800 square feet, with ample sunlight and all modern conveniences necessary in a place of this character. This has 48 beds, arranged in a space of 13,800 cubic feet, allowing 287 cubic feet for each. The men's department, facing the north, is not quite so cheerful as that occupied by the women, but, on the whole, is a decided improvement on the old quarters. In this part there are 135 beds in a total space of 27,500 cubic feet, leaving 204 cubic feet for each bed. In addition there are three smaller rooms on an upper floor, each having three beds. These are sometimes used for isolation. The surgeon's office covers 288 square feet and is thoroughly equipped with all the latest appliances, including operating table, sterilizer, microscope, desks, centrifuge, formaldehyde sterilizer for instruments, etc. The equipment now furnished will take care of immigrants entering this port under present conditions in ample style, and in the event of a Government detention station being built this equipment is modern and could be used for the demands of a large hospital.

The following are totals to be compared with last year's report:

Total number examined	4, 833
Total certified	348
Total hookworm cases	260
Total trachoma cases	16

The following table shows the increase in uncinariasis:

Age period.	Examined.	Infected.	Per cent.
JAPANESE.			
Females:			
0 to 14	10	4	40.0
15 to 30	481	147	30.5
31 to 50	87	21	24.1
Males:			
0 to 14	45	14	31.1
15 to 30	123	35	28.4
31 to 50	28	8	28.5
CHINESE.			
Females:			
15 to 30	1	....	....
Males:			
0 to 14	7	5	71.4
15 to 30	45	30	66.6
31 to 50	23	3	13.0
Total	850	267	31.4

TAMPA BAY QUARANTINE.

Acting Asst. Surg. B. B. Blount reports as follows:

Total number of crew examined	3, 533
Total number of passengers examined	55
Total number of crew certified	10

Causes of certification.

Trachoma	1
Rheumatism	2
Chancroid	2
Gonorrhea	4
Syphilis, secondary	1

The examination of foreign crews for the detection of excludable defects, should such persons desire to land, is a routine process at this port.

TUCSON, ARIZ.

Acting Asst. Surg. Meade Clyne reports as follows:

The acting assistant surgeon at Tucson, Ariz., has been called upon to examine at the local United States immigration service detention quarters during the fiscal year 1916 150 aliens arrested under the immigration and Chinese exclusion laws in various parts of Arizona and brought to this point for detention and hearing. Of this number 22 were Chinese, 116 Mexican, 1 Syrian, 1 Italian, 1 Canadian, 8 Japanese, and 1 Belgian.

While the acting assistant surgeon's work is principally the examination of arrested aliens upon their arrival at the immigration detention quarters here, he is frequently called upon to attend these aliens after arrival and to prescribe therefor, as many aliens arriving in good health require medical attention before their cases are disposed of. Two aliens were removed to a local hospital for treatment, one for a minor operation on the leg and the other for appendicitis—operation not necessary, however.

VANCOUVER, BRITISH COLUMBIA.

Acting Asst. Surg. Henry R. Storrs reports as follows:

Total number of immigrants examined	4,658
Total number of immigrants certified	204

WINNIPEG, MANITOBA, CANADA.

Acting Asst. Surg. Fred J. Hart reports as follows:

Aliens presenting themselves at this port for inspection consist largely of four classes:

1. Tourist and business class.
2. Bona fide settlers.
3. Those seeking admission for medical or surgical relief.
4. Those in transit to eastern Canada or European ports.

1. Of the tourist class many are on holiday trips, others for improved climate conditions, for personal pleasure and comfort, while some to treat at the various baths for rheumatic conditions or seeking improved climatic conditions for some form of lung trouble, e. g., chronic bronchitis, asthma, and pulmonary tuberculosis. The latter class is exceedingly small, because of the stringent immigration regulations. The business class are almost invariably healthy, and making only the necessary sojourn to accomplish their work.

2. The bona fide settler comprises largely trades people (of which a large number have migrated owing to financial depression occasioned by the war) and farmers. These settlers furnish a fairly large certification under class B for minor defects, such as slight deformities, loss of fingers, pterygium, meibomian cyst, etc.

3. Those going for medical or surgical treatment at the larger American clinics furnish the more serious certifications of class B—e. g., gastric ulcer, gallstones, enophthalmic goiter, malignant disease in all stages, etc.

4. The transit class are usually healthy and make the trip through the United States to visit friends or for the pleasure of seeing new

country, or, in the European cases, from necessity, especially since the war.

YARMOUTH, NOVA SCOTIA.

Acting Asst. Surg. A. M. Perrin, in charge, reports as follows:

During the fiscal year 25,005 passengers have been inspected by the medical officer at this station, which is 1,100 less than the preceeding year, on account of the disturbance in travel due to the European war.

The station at Yarmouth is at the termini of the Dominion Atlantic Railroad (Canadian Pacific Railroad), and the Halifax & Southwestern Railroad (Canadian Northern). These railroads connect with the Boston and Yarmouth steamship line (Eastern Steamship Co.), consisting of two steamships, the *Prince George* and the *Prince Arthur*, running daily in summer and semiweekly in winter. The distance from Yarmouth to Boston is 240 nautical miles. It is only an extended ferry over night.

In view of the fact that the average Nova Scotian is nomadic in his habits, that New England has a stable population of a hundred thousand Nova Scotians, one-sixth the entire population of this Province, that for 65 years New England, and Boston in particular, has been the mecca of the provincials, so much so that there is hardly a family in Nova Scotia that has not one or more members in the United States; the fisheries of New England being largely manned by Nova Scotia fisherman, it is obvious that the interchange of these people must be very great. Eighty per cent of the total passenger lists are made up of people from the western counties of Nova Scotia, the balance consisting of travel from the eastern counties, Prince Edward Island, Cape Breton, and some from Newfoundland, with the summer tourists visiting the "Land of Evangeline." The foreign immigrants arriving at Halifax do not enter the United States by this route. The steamships mentioned carry only first-cabin passengers.

The inspection of passengers at this station does not present any difficulties. Each passenger is inspected on the dock before going on board the ship.

The offices at this station are inadequate in size and equipment. A one-story building 24 by 24 feet houses four officers. A waiting room 20 by 30 feet is an absolute necessity; also telephone connection is required.

The number of passengers inspected outward is 25,005.

The number of aliens detained, registered, and certified free from disease is 1,290.

Number of class A certified	12
Number of class A (1) certified	0
Number of class B certified	38
Number of class C certified	12
Number of class A debarred	9
Number of class B debarred	11
Number of class C debarred	0
Total number of aliens certified	62

DOMESTIC (INTERSTATE) QUARANTINE.

The finding of infected rodents has necessitated the continuance of plague-suppressive measures in New Orleans throughout the year, although the last human case of the disease occurred September 8, 1915. Plague-preventive operations have also been conducted as in previous years at Seattle and its environs and in California, the recrudescence of the infection among ground squirrels in certain districts of the State having been noted. At the termination of the fiscal year all activities on the part of the Federal Government in the city of San Francisco were transferred to the city authorities, no plague rodents having been discovered since October 23, 1908.

Operations against Rocky Mountain spotted fever have been continued as heretofore, every effort having been made to limit the infection to territory already involved.

In July, 1916, the occurrence of poliomyelitis in New York City necessitated service activities to prevent the interstate spread of the disease, and early in the course of the epidemic an inspection and notification system was established in order that neighboring districts should be protected from the inroads of the infection.

The revised interstate quarantine regulations were promulgated January 15, 1916, and their enforcement has been a matter of attention throughout the year.

In connection with other Government bureaus exhibits have been made of service activities in the conservation of human life on the Government safety-first train and at other places. The exhibit installed at the Panama-Pacific International Exposition was continued until the termination of the exposition, when it was transferred to the exposition at San Diego, Cal.

The sanitary and relief work in Alaska, conducted in cooperation with the Bureau of Education, the inspection of Government buildings in the District of Columbia, and the various remaining service functions administered through this division have been performed as in previous years.

Plague-Suppressive Measures in New Orleans.

July 1, 1915, began the second year of plague-eradicative measures in New Orleans. While there have been many changes in the personnel and extensions of the work further afield, there has been but slight modification in the original plan of organization. The more important changes in the work accomplished relate to the following:

1. Introduction and general adoption of hydrocyanic acid as a fumigant in the fumigation of ships and buildings.
2. Study of the migration of rodents.
3. Routine examination of blood smears from rodents presenting only very slight or no gross lesions of plague.

4. Improved trapping methods and records.

Throughout the year but one case of human plague has occurred. This was a case of pestis minor, so mild in character that the presumptive diagnosis of plague remained in question until positively confirmed by laboratory examination, the patient, a young girl, having in the meantime fully recovered. During the former fiscal year 30 cases of plague occurred, with 10 deaths, making a total of 31 cases since the inception of the epidemic.

Rodent plague, however, has continued to a degree not anticipated, which again exemplifies the peculiar tenacity of this infection and the stubbornness with which it resists efforts of eradication, once it gains foothold. Notwithstanding, there has been a reduction in the number of rodent cases, indicated comparatively as follows:

During the fiscal year ending June 30, 1915:	
Number of rodents examined	263,752
Number found plague infected	211
During the fiscal year ending June 30, 1916:	
Number of rodents examined	101,163
Number found plague infected	67

The number of rodents identified as plague infected in 1916 was 66.2 per 100,000, as compared with a ratio of 80 per 100,000 in 1915.

With regard to rodents trapped, there has been a rather uniform reduction in the number throughout the various districts, the total per diem catch having reached the low average of about 200, whereas during the previous fiscal year the daily average at one time reached 1,700 rats.

GENERAL ORGANIZATION.

There have been few modifications in the general plan of organization originally adopted at the inception of plague-eradicative work. These relate to minor administrative details found necessary to meet local problems. There have been many changes in the personnel, however, through the detail of officers to various stations, in part to afford opportunity for the instruction of other officers in plague work and because of service exigencies. At the beginning of the fiscal year eradicative measures were in charge of Surg. R. H. Creel, but on May 15, 1916, Surg. Creel was relieved by Passed Asst. Surg. Friench Simpson. At various times during the year the staff of the medical officer in charge has been composed of the following officers: Passed Asst. Surgs. C. W. Chapin, R. A. Kearny, and C. L. Williams, and Asst. Surgs. H. F. White, J. H. Smith, jr., F. A. Carmelia, J. B. Laughlin, H. C. Cody, F. M. Faget, C. V. Akin, M. S. Lombard, W. C. Teufel, and T. B. H. Anderson, together with Acting Asst. Surgs. M. D. Hollis, Percy Ahrons, and Park Howell. The laboratory operations have been in charge of Passed Asst. Surg. C. W. Chapin and Passed Asst. Surg. C. L. Williams.

Other important changes relate to the general reduction in the force of employees for economic reasons, such reductions being made promptly whenever completed work in any portion of the field permitted.

District management under the direct supervision of service officers has continued along the same general lines. Only one reduction in the number of districts has been affected; this through the merging of sanitary districts Nos. 1 and 2, the resulting district being placed under the direction of one officer. There has been as yet no further opportunity for the reduction in the number of districts on account of the addition of more territory, the town of Algiers having been included in the rat-proofing work following the appearance of rodent plague within its limits.

The territory embraced by district No. 5 has been extended to the Orleans Parish line, and following the appearance of rodent plague in the vicinity of Chalmette Wharf, in the parish of St. Bernard, the extension of rat-proofing operations to include the town of Arabi and the territory adjacent has been provided for. Further extensions of this character are contemplated to include the territory bordering on the Mississippi River on its south bank from Algiers to Westwego, rodent plague having been demonstrated in McDonoghville, Gretna, Harvey, and Westwego.

LEGAL ENACTMENTS.

Rat-proofing measures in the city of New Orleans were enforced originally under board of health ordinance No. 17, enacted at the inception of the work. The measures adopted, not meeting with the approval of a small percentage of property owners, an organization was effected and through its efforts the legality of the enactment was tested in the supreme court of the State. This original ordinance was declared unconstitutional because of certain technical provisions granting undue discretion to the health officer and in its place there was enacted an ordinance known as commission council series No. 2512. In this second ordinance all constitutional objections were eliminated. It has been tested in the supreme court of the State, where it was upheld in every particular, and is the ordinance under which operations are at present being enforced.

During the fiscal year 2,569 affidavits for noncompliance with the provisions of this enactment have been filed. Of this number 357 were convicted and fined and 1,031 were dismissed at the request of the service, either because of compliance or beginning compliance with the requirements of the rat-proofing ordinance. Eight hundred and eighty-five dollars in fines were imposed.

OUTGOING QUARANTINE.

Quarantine restrictions for the prevention of the introduction and the exportation of plague by incoming and outgoing vessels have been strictly enforced throughout the fiscal year. Such measures require the fending off of all vessels a distance of not less than 8 feet from the wharf amidships, the rat guarding of all mooring lines, or similar connections with the shore, and the raising of gangplanks at night. Both night and day inspections are made, and conditions found are included in a daily written report covering operations for 24 hours. Violations are followed by the issuance of a foul bill of health and the filing of affidavits against the offending vessel, a special mounted police officer being detailed to gather evidence, file affidavits, and act as prosecuting witness. However, with a few exceptions, cheerful compliance and full cooperation have been extended by the various steamship agents, masters, and others concerned, and affidavits have been few. In only one instance has the court found it necessary to impose a jail sentence in addition to the nominal fine. This was followed generally by a more careful observance of the regulations.

In addition to these measures the routine fumigation of all ships docking at New Orleans is required. This measure is imposed upon all vessels, preferably when empty, and is now carried out once every four months, the certificate of a service officer to that effect being required prior to the issuance of a clean bill of health.

At the beginning of plague-eradicative measures reliance was placed principally upon carbon monoxide and sulphur dioxide gas supplemented by hydrocyanic acid gas in selected cases. This latter fumigant was soon found particularly advantageous, and in order to systematize the method of application and standardize the proportions of cyanide, acid, and water required for efficient and economic use, Surg. R. H. Creel, assisted by Asst. Surg. Faget and Sanitary Engineer Wrightson, carried out numerous and painstaking experiments covering the quality and quantity to be used, the proper method of exposure, and the effects of the gas upon various forms of animal and insect life, more especially upon rats, roaches, body lice, bedbugs, fleas, and mosquitoes. A full report of the results of these experiments has been made in Public Health Reports, Reprint No. 313.

Briefly, the fumigant, hydrocyanic acid gas, was found to be ideal for both ship and house fumigation. In the proportion of 5 ounces of sodium cyanide to each 1,000 cubic feet of computed space the gas evolved possesses penetrative qualities superior to sulphur dioxide, and kills both rats and fleas, an exposure of one hour's time being fully ample, apparently, for the successful and efficient destruction of these forms of animal and insect life. Its practical application in ships and in buildings requires no more labor or apparatus than is required in the use of sulphur gas, and the cost is practically the same. Further, the shorter period of exposure of a ship to the gas, namely 1¼ hours in the case of hydrocyanic acid, as compared with 6 to 12 hours with sulphur, effects such a marked saving in time to the ship that this method of fumigation seems peculiarly adapted to this class of work.

The fumigant is of course rapidly fatal to human life and due precautions must invariably be taken. Such precautions are not difficult of application, and when proper care is used the danger is negligible. To date 426 ships have been fumigated with cyanide gas at the port of New Orleans, and with the exercise of due care no fatalities have resulted. Briefly the method of procedure at New Orleans is as follows:

The gas is generated in oak barrels placed in the various compartments of the ship, the quantity of material necessary and the number of barrels required being computed at headquarters in advance. The cyanide required for each barrel is weighed out in the storeroom and tied up in ordinary pillow slips. The sulphuric acid is measured and placed in stoneware jugs. Barrels, cyanide, acid, paste, and paper are then conveyed to the ship and the materials placed on deck. The barrels are contained in metal frames or "slings" for easy and safe handling and the necessary water added. All openings in the vessel are now made gas-tight and the barrel lowered into the hold, the rope being made fast to the hatch combing above, the hatch covers being partially closed. The sack of cyanide is then lowered by a rope and suspended above the acid within the mouth of the barrel, this rope being likewise made fast to the hatch combing above.

Small compartments are treated by placing the acid solution in open stoneware crocks or wooden buckets, the cyanide being placed alongside. When the entire ship has been prepared in this manner the cyanide is lowered into the acid, barrel by barrel, and the hatch covers completely closed. In small compartments the cyanide is dropped into the crocks by hand and the room quickly vacated and closed. Exposure of all holds and large compartments for not less than 1¼ hours is required; for small staterooms and the like, not less than 30 minutes. At the end of these periods the ship is opened up for natural ventilation, supplemented by artificial means whenever possible. Entrance into the holds is not permitted until at least 1 hour has elapsed, and then only with due precaution. If evidence of gas remains this time must be extended proportionately.

Prior to the beginning of operations a written statement is required of the master in charge, or his representative, reporting that the entire personnel of the vessel has been accounted for and that no one remains aboard.

As a general average about 4 hours' time is required for the completion of the entire process, namely, 1 hour in preparation, 1 hour of exposure, and 2 hours for ventilation before the ship can again be entered in safety. Where supplementary artificial measures of ventilation are employed the time of delay is further reduced.

The above method of procedure has now been thoroughly tested out at New Orleans and the success obtained recommends the use of cyanide for general fumigation work for the destruction of rats, fleas, and mosquitoes, and specific cases for eradication of roaches, bedbugs, and body lice, under conditions where its application can be controlled and in the hands of those familiar with its use.

Whenever the circumstances surrounding the movement of vessels will permit, a thorough and complete search for dead rats follows each fumigation. In addition traps are exposed in all ships before and after fumigation whenever practicable. A careful record of results is kept. As far as preliminary report will permit deductions it has been found that frequent and thorough fumigation of the ship throughout is necessary for complete deratization, and until such procedures are frequently and efficiently carried out the fending off and rat guarding of vessels in port should always supplement fumigation as an additional precautionary measure.

Of particular interest in this connection, and showing the value of fumigation is the case of the steamship *Trevelyan*, a brief history of the vessel being as follows:

The ship left Karachi, India, on October 2, 1915, called at Dartmouth, England, in November, 1915, then Dieppe, France, and visited Newcastle-on-Tyne in December, 1916. She reached Gibraltar on March 4, 1916, and then sailed for the United States, arriving at Quarantine, Louisiana, April 6, 1916, in ballast, where she was fumigated throughout with sulphur.

On arrival at New Orleans on April 7, 1916, the steamer was required to fend off and rat guard. Traps were placed aboard and the vessel was thoroughly searched for rats. Twenty-eight rats were found dead and 10 rats were subsequently trapped. These rats were transmitted to the laboratory for examination, and one of the number, a female *Alexandrinus*, dead from sulphur fumigation, was found infected with bubonic plague, the findings being fully confirmed by every known biological and cultural test. No evidence of the disease was noted among the other rats killed or captured. Whether they escaped infection or had the disease in varying numbers without evidence thereof at the time of the autopsy is a matter of conjecture. The case is cited as showing conclusively the possibilities of ship-borne plague and the value of efficient quarantine restrictions for the prevention of the spread of the disease.

A compilation of the work performed by the outgoing quarantine division is as follows:

Outgoing quarantine, July 1, 1915–June 30, 1916.

Carbon-monoxide fumigation:	
Number of vessels fumigated	425
Coke consumed, by pounds	634, 900
Sulphur fumigation:	
Number of vessels fumigated	444
Sulphur consumed, by pounds	74, 603
Hydrocyanic acid gas fumigation:	
Number of vessels fumigated	426
Sodium cyanide, by pounds	20, 636
Sulphuric acid, by pints	29, 772
Total number of fumigations	1, 285
Clean bills of health issued	1, 731
Foul bills of health issued	219
Fumigation certificates issued	316

LABORATORY.

During the past year the laboratory has continued the examination of rodents for plague infection. A total of 378,006 rodents has been received, of which 101,163 were examined and 67 found plague infected. The following table indicates the species of the rodents received:

Rodents received at laboratory from July 1, 1915, to June 30, 1916	378, 006
Mus norvegicus	55, 473
Mus rattus	8, 163
Mus alexandrinus	8, 222
Mus musculus	293, 490
Unclassified	500
Putrid, species not determined	5, 665
Total	371, 513
Muskrats (Fiber zibethicus)	280
Wood rats (Sigmodon nispidus)	4, 743
Wood rats (Hesperomys palustris)	1, 446
Opossums (Didelphys virginiana)	13
Minks (Putoria (Lutreola) vison)	4
Monkey	1
Rabbit	1
Guinea pigs	5
Total	6, 493

Classified according to species, the infected rodents were as follows:

Mus norvegicus	54
Mus rattus	3
Mus alexandrinus	8
Mus musculus	2
Total	67

Frequency of lesions found in infected rodents:

Buboes:	
Cervical only	3
Axillary only	2
Inguinal only	3
Subcutaneous injection	46
Granular liver	26
Pleural effusion	24
Abscess of liver	1
Necrosis of liver	3
Abscess of spleen	2
Adhesions of spleen	1
Scars on spleen	4
Ruptured spleen	3
No lesions (plague-like organisms in smears only sign)	12
No lesions (animals inoculated because rat was caught at infected location)	2

From the foregoing it may be noted that in order of frequency the plague lesions observed were subcutaneous injections, granular liver, and pleural effusion, the incidence of buboes being even less than for the previous year.

The rodents examined from July 1, 1915. to June 30, 1916, by sex and species, were as follows:

Mus norvegicus:	
Male	18, 768
Female	36, 705
Mus rattus:	
Male	3, 793
Female	4, 368
Mus alexandrinus:	
Male	3, 801
Female	4, 423
Mus musculus	22, 312
Unclassified:	
Male	166
Female	334
Wood rats:	
Male	2, 759
Female	1, 984
Species C (Identification pending):	
Male	710
Female	736
Muskrats:	
Male	151
Female	129
Opossums	13
Guinea pigs	5
Minks	4
Monkeys	1
Rabbits	1
Total examined	101, 163
Rodents not examined	276, 843
Rodents received	378, 006

The total number of rodents received at the laboratory since the inception of the plague campaign to date is 756,569, of which 364,915 have been examined. Of these, 311 have been found infected.

A flea survey has been conducted as heretofore. A total of 1,268 rats have been examined for fleas and 4,394 fleas removed, an average for the year of 3.46 fleas per rat. As was observed last year, Xenopsylla cheopis has been the predominant flea found on rats. In the two following tables are given complete data concerning the flea count for the year, including the count by weeks:

	Number.	Average number fleas per rat.
Total Mus norvegicus examined	1,117	
Fleas found	3,935	3.522
Xenopsylla cheopis	2,988	2.675
Ctenopsylla musculi	688	.616
Ceratophyllus fasciatus	81	.072
Ctenocephalus canis	123	.110
Pulex irritans	40	.036
Echidnophaga gallinacea	15	.013
Total Mus alexandrinus examined	86	
Fleas found	300	3.488
Xenopsylla cheopis	195	2.267
Ctenopsylla musculi	96	1.116
Ceratophyllus fasciatus	7	.081
Ctenocephalus canis	2	.023
Total Mus rattus examined	42	
Fleas found	157	3.738
Xenopsylla cheopis	71	1.690
Ctenopsylla musculi	79	1.881
Pulex irritans	7	.166
Total wood rats examined	13	
Fleas found	2	.154
Xenopsylla cheopis	2	.154
Total mice examined	10	
Total rats examined	1,268	
Total fleas found	4,394	3.465

Flea infestation of rats—Average number of fleas per rat.

Week ending—	Mus norvegicus.		Mus rattus and alexandrinus.	
	Xenopsylla cheopis.	Ceratophyllus fasciatus.	Xenopsylla cheopis.	Ceratophyllus fasciatus.
1915.				
July 3	4.037			
July 10	1.781			
July 17	1.636			
July 24	2.031			
July 31	3.777			
Aug. 7	2.181			
Aug. 14	.350			
Aug. 21	.933			
Aug. 28	4.625			
Sept. 4	.814			
Sept. 11	2.827		4.250	
Sept. 18	1.592		1.750	
Sept. 25	2.333			
Oct. 2	1.000			
Oct. 9	3.791		2.000	
Oct. 16	1.000		1.250	
Oct. 23	5.064		2.000	
Oct. 30	1.392	0.035	2.000	
Nov. 6	.600			
Nov. 13	6.250			
Nov. 20	5.750			
Nov. 27	.600		1.000	
Dec. 4	1.300	.100	1.333	
Dec. 11	2.600			
Dec. 18	.363			
Dec. 25				

Flea infestation of rats—Average number of fleas per rat—Continued.

Week ending—	Mus norvegicus.		Mus rattus and alexandrinus.	
	Xenopsylla cheopis.	Ceratophyllus fasciatus.	Xenopsylla cheopis.	Ceratophyllus fasciatus.
1916.				
Jan. 1	.482		4.500	0.833
Jan. 8	1.923	.923	.833	
Jan. 15	2.476	.714		
Jan. 22	1.500			
Jan. 29	.750		1.500	
Feb. 5	2.631	.105	4.000	
Feb. 12	1.625	.375		
Feb. 19	.666			
Feb. 26	.200			
Mar. 4				
Mar. 11				
Mar. 18	5.000			
Mar. 25	.714			
Apr. 1	.100		6.000	
Apr. 8	1.000			
Apr. 15	1.105		8.666	
Apr. 22	1.400	.066		
Apr. 29	4.789	.052		
May 6	2.763	.526		
May 13	1.033		1.500	
May 20	3.000		1.500	
May 27	2.025	.050	.428	
June 3	2.666	1.000	4.000	
June 10	3.609	.024	8.000	
June 17	7.666		1.570	
June 24	6.930		7.833	
Six days ending June 30	6.148		3.000	

Great pains have been taken to discover all plague-infected rats. To help in this, smears from the liver and spleen of all rats have been miscroscopically examined as a supplement to the regular macroscopic examination. By this means 12 plague-infected rats have been discovered which showed no gross lesions whatever suggestive of plague, but were rendered suspicious through the discovery of plague-like organisms in smears. All cases of plague have been carefully confirmed by animal inoculations, and by isolation of *B. pestis* in pure culture and its identification culturally and by animal inoculation.

Two conditions of considerable interest have been developed during the year. One is the marked rise in the number of plague rats during May, and more particularly June, 1916, contemporaneously with a marked increase in the number of fleas (particularly *Xenopsylla cheopis*) per rat. It is believed that there is a direct relationship between these two phenomena.

The other condition is the large proportion among plague-infected rats of cases showing very slight or indistinct signs of plague, and in some instances of no lesions whatsoever, the determination of the infection either being made by smears or animal inoculation. Heretofore it has been accepted that the naked-eye examination by a competent observer is more satisfactory than microscopical examination alone, and that the results demonstrate that the omission of the routine microscopical examination of every rat in an investigation conducted on a large scale does not necessarily impair the accuracy of the work. These views were formulated by the English plague commission and have since been upheld by other experimentalists; in consequence of this laboratory workers have almost without exception abandoned routine smear examination, believing it to be a laborious procedure of doubtful value.

In studying the incidence of rodent plague in various epidemics a striking feature observed was the recrudescence of the disease at varying intervals, periods of several months at times occurring during which infected rats were either relatively rare, or in some instances altogether absent, with no diminution whatever in the rodent catch. A number of theories in explanation of this phenomenon offered themselves, the possibility of infected rats being missed by the macroscopic method being most plausible. This theory received substantiation in the following manner: On two occasions rodents evidently seriously ill reached the laboratory, but in each instance upon autopsy no gross lesions of plague were discovered, yet through the employment of animal inoculation they were proved to be plague positive. Later, as the epidemic progressed, an increasing relative and absolute number of rodents showing slight or indistinct lesions were found, the diagnosis in each case being established by inoculating guinea pigs. These facts seemed to warrant the conclusion that an appreciable number of infected rodents were unavoidably missed where sole reliance was placed upon macroscopic evidence. Supplementary routine examinations of the smears made from the liver and spleen of all rodents were initiated in the fall of 1915 and have been continued throughout the year.

That the institution of the combined method of examination, in contradistinction to the single procedure which depends upon macroscopic evidence, has been of benefit is in part indicated by the following table, it being understood that routine smears have been made only during the last nine months of the year:

Infected rats showing distinct lesions of plague	34
Infected rats showing indistinct lesions of plague	11
Infected rats showing no lesions of plague	2
Infected rats showing signs of resolving plague	8
Infected rats determined by smears only (no gross lesions present)	12
Total number of infected rodents	67
Total number of infected rodents not showing marked signs of plague	33

For practical purposes the macroscopic method of diagnosis of rodent plague is to be preferred over the microscopic, if either is to be used independently of the other, but the conjoined examination will, it is believed, detect a larger percentage of diseased rodents than could be determined by any single method.

HUMAN PLAGUE.

A case of human plague was diagnosed by Passed Asst. Surg. C. W. Chapin on September 8, 1915. The patient was a young woman who was only mildly ill. When seen she was convalescent. Diagnosis was accomplished by inoculating guinea pigs with material aspirated from inguinal bubo.

INCIDENCE OF THE EPIZOOTIC.

The infected rats identified throughout the year were obtained from the following widely separated points:

In the city of New Orleans, generally and rather equally distributed	53
In Algiers, Orleans Parish	4
In McDonoghville, Jefferson Parish	1
In Gretna, Jefferson Parish	1
In Harvey, Jefferson Parish	1
In Westwego, Jefferson Parish	2
In Arabi, St. Bernard Parish	2

Total plague rats identified, 67; total foci, 64.

Algiers, McDonoghville, Gretna, Harvey, and Westwego are situated on the opposite side of the Mississippi River from New Orleans; they are contiguous and extend along the south bank in the order named. The foci in St. Bernard Parish are located about 15 blocks from the nearest known focus, namely, case No. 280, at No. 233 St. Maurice Avenue, New Orleans, La. The foci uncovered in the city of New Orleans are rather equally distributed in relation to each other and, in the majority of cases, are situated in the vicinity of previously recognized foci, but in no instance has a direct relationship been established.

With the beginning of the fiscal year it was confidently believed that the high-water mark of rodent infection had been reached and that there would follow a steady decline in the epizootic, to be succeeded within the year by its complete disappearance. A large proportion of the rat-proofing work had been accomplished; there had been effected a marked reduction in the daily rat catch; and there had occurred but 14 cases of rodent plague during the previous six months.

As anticipated, there has resulted a marked reduction in the total number of rodent cases as compared with the previous year—namely, 67 against 244—but the expected decline and disappearance of the disease has not been realized. Rather, there have occurred within the known plague area sporadic cases, scattered here and there, without definite relation to any known focus; and, in addition, the epizootic has been demonstrated much farther afield, namely, in St. Bernard Parish, in Algiers, McDonoghville, Gretna, Harvey, and Westwego. Further, just at the close of the fiscal year there has occurred a rather puzzling exacerbation of the disease, especially during June, the number of infected rats captured, by months, being as follows: January, 4; February, 4; March, 4; April, 3; May, 9; June, 15.

What are the conditions present which have permitted the perpetuation of the disease? An explanation is offered through the assumed operations of four interrelated conditions, namely:

1. The continuation of isolated rat harborages.
2. The presence of chronic plague among rats infesting such harbors.
3. The proclivity of rats to migrate.
4. The fluctuation in the number of infesting fleas, especially *Xenopsylla cheopis*.

It is believed that the conjoined effect of the above conditions is responsible for the perpetuation of plague in New Orleans. These conditions all continue present and may be further discussed as follows:

1. *Continuation of isolated rat harborages.*—Unfortunately there yet remain in New Orleans many nonrat-proof premises, which for various reasons have resisted every effort for their removal. This may be charged to the tardy action of the dock board in having failed to proceed with the proper rat proofing of the wharves of New Orleans; to organized legal opposition to the enforcement of the rat-proofing laws, causing suspension and delay in carrying out important and necessary work while awaiting the decision of the supreme court; to the widespread and destructive effects of a tropical storm in September, 1915; to delayed rat proofing by property owners financially unable to meet the required cost; and, to a less degree, to small unrecognized, undiscovered, or neglected defects in buildings previously rat proofed which permit rat harborage.

2. *The presence of chronic or so-called latent plague.*—Among the 67 rats reported, 19 were diagnosed as infected with chronic or so-called resolving plague. Many such rodents presented few or no gross lesions at necropsy, with negative blood smears, yet proved positive for plague without evidence of any diminution in the virulence of the microorganisms. This condition continues one of the mysterious and imperfectly understood characteristics of the disease.

It is known that such rats have acquired partial immunity, and it is known that they continue to harbor the infecting organism acting as a culture medium, yet presenting few or no gross lesions. It is not known that rats diseased in this manner transmit infection, yet, as a practical explanation for the latency and tenacity of plague in certain localities, it seems reasonable to assume that following an epidemic rodents here and there contract the disease and acquire partial immunity thereto. It is believed that such chronically infected rats may transmit plague, that they occupy the various and widely separated localities from which plague has been obtained, and that so long as conditions remain unfavorable for fleas or mechanical transference the disease continues quiescent, unrecognized. From time to time, under more favorable conditions, such as the periodic multiplication of infesting fleas, transmission occurs, followed by the development of acute plague in associated rodents. This would account for the reappearance of the disease in certain localities and explain its so-called latent periods.

3. *Migration of rodents.*—It has long been conceded that plague once introduced into a community spreads principally through the migration of rodents from infected points into contiguous territory, but it remained for Surg. Creel to demonstrate through practical migratory experiments that such rodents frequently migrate rapidly to widely separated and far distant points. These experiments were reported in Reprint No. 278 of the Public Health Reports. In one series 179 marked rats were liberated. Within 3 days 27 rats were recaptured at varying distances of from 1 block to 1 mile; 43 were recaptured in 15 days at varying distances of from 1 block to 3¼ miles. Within 37 days' time 81 of the liberated rats had been retaken. This would indicate the possible spread of disease to far-distant

points during a short period of time, and would suggest that the disease has been transmitted by migration to St. Bernard Parish from the vicinity of the focus on St. Maurice Avenue, and from Algiers or Westwego to Gretna, McDonoghville, and Harvey, or from other distant and previously infected points.

4. Fluctuation in the flea counts.—The percentage of fleas per rat recorded by the laboratory has been ascertained from live rodents, and while the number of rodents examined for this purpose has been few compared with the total catch, a sufficient number was searched to justify the belief that the percentage of fleas found per rat represents a reasonably accurate report. Based upon these findings, there has been noted a fairly uniform rise in the average number of *Xenopsylla cheopis* immediately preceding and during each exacerbation of rodent plague in New Orleans, and it is believed that a direct relationship exists. This was especially significant during the increase in the number of rodent cases in May and June, indicated as follows:

April, number of *Xenopsylla cheopis* per rat, 1+; rodent cases, 4.
May, number of *Xenopsylla cheopis* per rat, 2+; rodent cases, 5.
June, number of *Xenopsylla cheopis* per rat, 5.4; rodent cases, 15.

Coincident with this increase in the flea count reported by the laboratory, some 15 "flea complaints" were received from various points in the city, and it has been assumed that the recent exacerbation of this disease is the result of increased flea multiplication, increasing the opportunities for flea transmission of the disease from an acutely or chronically infected rat here and there to associated rodents.

SOURCES OF INFECTION.

The infected rats identified were obtained from the following character of buildings:

Dwellings, in yards	28
Dwellings, inside	1
Food depots, inside	10
Food depots, in yards	4
Open areas, dumps, and lots	8
Sewers	7
Business establishments, inside	5
Wharves	3
Total	66
Inbound ships	1
Total	67

While the greatest number of infected rats came from the vicinity of dwellings—that is, in adjoining yards—it must be remembered that the number of premises of this character exceeds all other forms and that attached yards are more readily and more generally trapped than interiors. When the number of food depots, 2,865, yielding 10 infected rats, is compared with the number of dwellings, 67,589, yielding only 28 infected rats, it is readily seen that proportionately a greater percentage of infected rats were captured in food depots.

It is noteworthy that no infected rats were captured in stables, of which 3,888 are recorded, whereas during the previous fiscal year

45 infected rats were obtained in such premises. This is attributed in part to the strictly rat-proof character of all work required in such places.

TREATMENT OF FOCI.

Premises from which suspicious or positive rats have been taken are immediately inspected upon receipt of such report from the laboratory. Intensive trapping is at once instituted throughout the block in which the case occurs. The treatment depends upon the character of the surroundings. If the premises consist of a lot or other open area, little is required beyond the thorough cleaning of same, with elevation of any material stored thereon. All buildings in the vicinity not previously rat proofed are inspected and such measures at once required. Occurring in the yard of a dwelling, all débris is ordered removed and all lumber or other material elevated. Nonrat-proof sheds are ordered repaired in accordance with the rat-proofing law, and the dwelling chain walled or elevated, if not previously rat proofed. A thorough clean-up follows, the premises are sprayed with a pulicide, and rat traps placed throughout.

Buildings, such as wholesale groceries, warehouses, etc., in which plague has been found are at once fumigated with hydrocyanic acid gas for the destruction of fleas and remaining rats and for the protection of individuals occupying the premises. This is followed by a general clean-up and the immediate repair of any defects present in the building which would permit rat harborage.

Several plague rats have recently been obtained from buildings of this character, namely, at 801–845 South Fulton Street, 304–312 Poydras, 225 Poydras, 515 Magazine, and in a large warehouse located at Bienville and North Peters Streets. In each case the building was fumigated throughout with cyanide. Among the rats obtained through fumigation additional plague rats were found as follows: One at North Peters and Bienville and one at 515 Magazine Street, indicating the value of such procedure for the destruction of rats and fleas and for the protection of occupants.

The conditions prevailing at the United warehouse, a building occupying the premises at 801–845 South Fulton Street, afford interesting details of plague-suppressive measures. This warehouse covered an area of approximately 65,000 square feet, with a cubic capacity of over 1,600,000 cubic feet, the entire space being fairly well filled with merchandise. Following the confirmation of human plague case No. 31 it was found that tobacco used at the factory where this person probably contracted her infection was previously stored at the warehouse in question. Intensive trapping was immediately instituted at that point, resulting in the capture of an infected rat (*Mus rattus*). However, trapping operations were somewhat disappointing in that the yield of rodents was below what was to be expected. The conditions at the warehouse were such that it was deemed advisable to utilize fumigation for the destruction of rats which it was reasonably sure were present. Cyanide was determined upon for this purpose, and following the employment of a very considerable force of men for the purpose of pasting up cracks and making the building air-tight the measure was put in force. The amount of sodium cyanide used for this single fumigation was 400 pounds, with 800 avoirdupois pounds of sulphuric acid, exposure being for two and a half hours. The total cost of the materials used was $130, whereas if sulphur had been used in the strength of 4 pounds per 1,000 cubic feet of space the cost would have been $160. A further saving was effected in the time and labor consumed. Captive rats and fleas were introduced for the purpose of controlling the efficiency of the fumigation and were afforded protection which might have been obtained under natural conditions. At the termination of the fumigation all control animals and insects were dead. A preliminary search of the premises and a more thorough examination later resulted in the finding of 137 dead rats and 54 mice. None of these rodents exhibited signs of plague, but a composite emulsion made from the tissues of various groups of the rodents and inoculated into several guinea pigs demonstrated that at least one of the mice and one additional rat must have been plague positive. Practically all the rats found were the trap-shy *Alexandrinus* and *Rattus*, thus explaining why trapping operations had been relatively unsuccessful. Subsequently the entire warehouse was made rat proof and ceased to be a menace to neighboring districts.

TRAPPING.

An efficient trapping force is of the utmost importance in an antiplague campaign, and no effort has been spared to maintain a perfect trapping organization at all times. The delineation of infected districts, the status of the epizootic in proved areas, and the destruction of rats are all dependent upon the effectiveness of trapping operations. Few changes have been made in the routine methods employed and perfected during the preceding fiscal year, beyond increased supervision and the introduction of rat maps. District officers now make the rounds with a selected trapper twice each week, and in this manner become intimately acquainted with the character of the work performed by each man. This has materially raised the standard of the trappers' work and has also afforded opportunity for the discovery of many rat-harboring premises requiring immediate and vigorous action.

In addition to increased supervisory measures rats trapped are now posted on a map of the district located in the district office, the various species and the number trapped at each location being denoted by colored beads. This permits the degree of rat infestation at any particular locality to be noted at a glance. When excessive at some particular point, the premise is inspected and the harborage removed through the inauguration of rat-proofing measures. Where vacant areas occur on the map, showing an absence of rats, the reasons for this are at once ascertained in order to determine whether or not the locality is being efficiently trapped or has been made rat proof.

Of interest in showing the effectiveness of rat-trapping operations are the results of trapping in connection with certain experiments in rodent migration. These experiments were carried out primarily in order to study the migratory habits of rats. The number of rats retaken throughout the city was a matter of congratulation, showing very conclusively the effectiveness of trapping methods. In one instance 179 live rats were liberated at a central point. Within 37 days 81, or over 45 per cent, of the liberated rats had been retaken in traps at widely separated points in the city. In a second instance 113 rats were liberated. Within 26 days 60, or 53 per cent, had been retaken.

At the beginning of the fiscal year 1915, 175 trappers were employed, handling 3,000 cage and 30,000 snap traps. Through increased skill in trapping and because of a reduced rat catch it has been possible to reduce the force to 143 men, handling 1,600 cage and 26,000 snap traps, without impairing the efficiency of the work in any way.

The total rat catch for the fiscal year ending June 30, 1916, is as follows (for comparative purposes there has been added the rat catch for the previous year):

Species.	1916	1915	Total.
Mus norvegicus	55,473	206,137	261,610
Mus rattus	8,163	7,357	15,520
Mus alexandrinus	8,222	8,704	16,926
Total rats	71,858	222,198	294,056
Mice	293,490	154,988	448,478
Unclassified	6,165	2,401	8,566
Grand total	371,513	379,587	751,100

From an examination of the total rodent catch there is apparently little reduction in the number trapped as compared with the catch of the previous year. This is due to a marked increase in the number of mice trapped, this increase being graphically indicated on chart No. 1, showing trapping operations for the fiscal year. If total rats trapped is now noted in the above tabulation, it will be seen that while there has been no reduction in the number of *Rattus* and *Alexandrinus* trapped, a marked reduction has been effected in the number of Norway rats, the catch being 150,664 less than for the previous year, practically a reduction of 75 per cent. The increase in the number of mice trapped is due to their multiplication following the removal of their associated and destructive enemy, the Norway rat.

It should be noted that there has been little change in the number of *Rattus* and *Alexandrinus* trapped. These rats, which are very cunning and generally trap shy, commonly occupy upper floors. Undisturbed by trapping operations, they in turn multiply after the removal of their more vigorous enemy, *Mus norvegicus.* The absence of increase in the number trapped, in the presence of a marked reduction in Norway rats, would seem to indicate considerable success in their control through trapping and rat-proofing operations, especial attention having been given in this campaign to the rat proofing of upper floors for the elimination of these forms.

Comparative rat-trapping data covering the entire field are not available, because of the extensions of rat-trapping operations further afield from time to time in districts Nos. 5, 6, and 7. For this reason chart No. 2 has been prepared to include only districts Nos. 1, 2, 3, and 4, since these districts include practically the same territory trapped over since the inception of the work. On this chart is indicated the average daily rat and mouse catch by weeks for the fiscal year.

CHART 1.

U. S. PUBLIC HEALTH SERVICE

AVERAGE DAILY RAT & MOUSE CATCH — BY WEEKS.

NEW ORLEANS, LA.

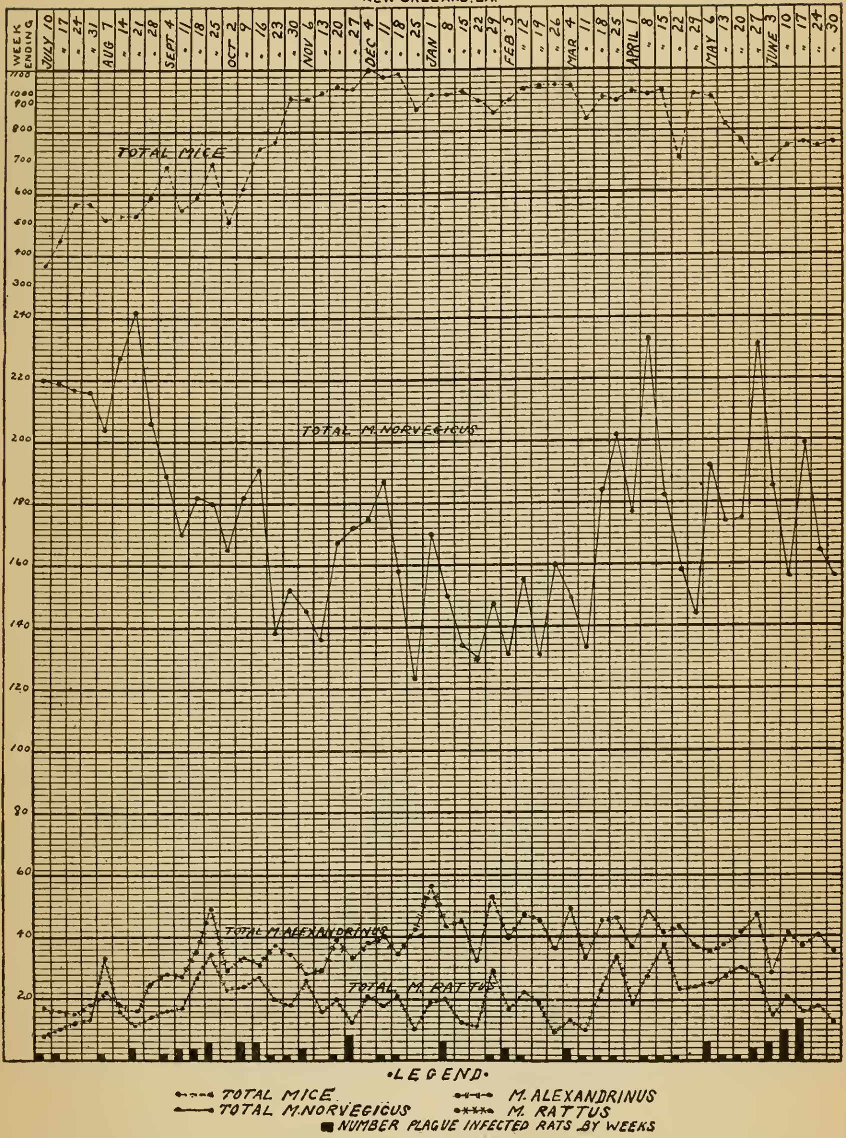
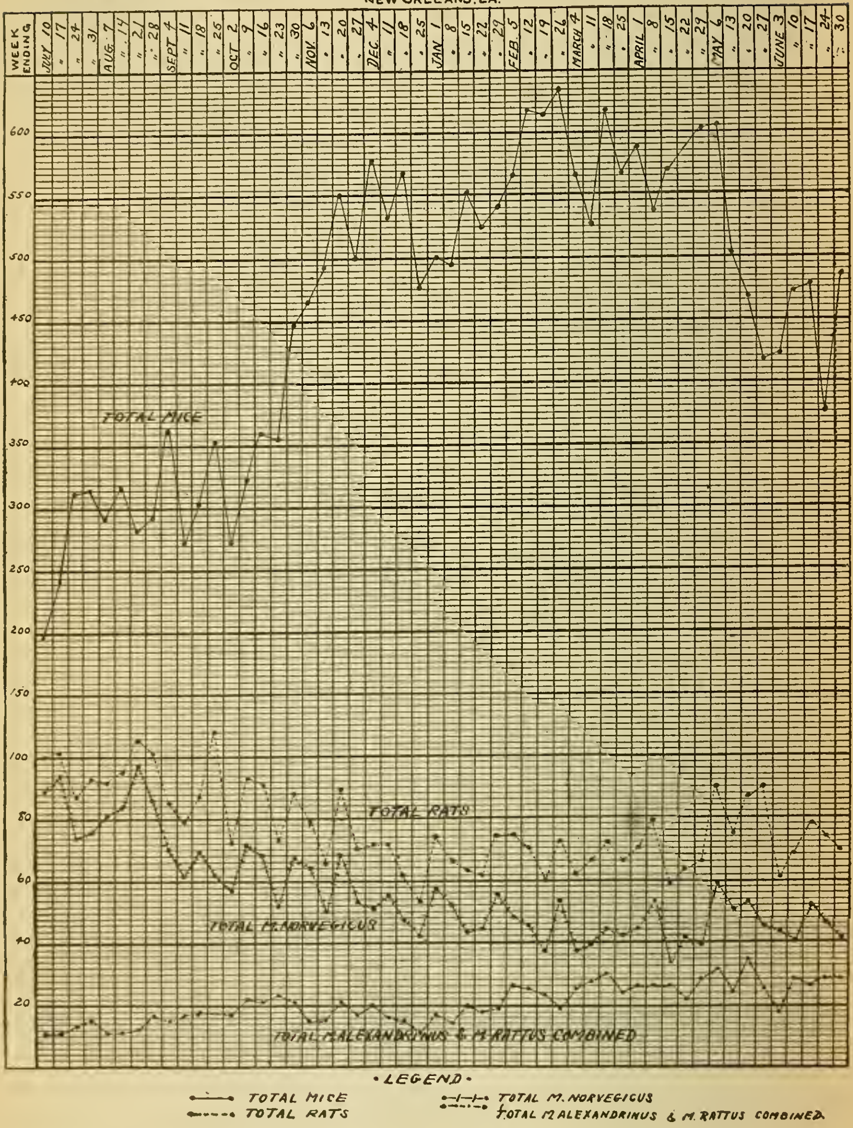


CHART 2.

U. S. PUBLIC HEALTH SERVICE
AVERAGE DAILY RAT & MOUSE CATCH, BY WEEKS = DISTRICS 1-2-3 & 4.
NEW ORLEANS, LA.



In a general way it is to be noted that with the gradual increase in the number of mice there has been consistent decrease in the number of rats trapped. Further, there has been a slow but steady decrease in the total rats captured, this being due to a reduction of Norway rats. For practical purposes the catch of *Alexandrinus* and *Rattus* is shown combined, since they occupy the same habitat and occur in about equal numbers. Among these rats there has occurred a slight but steady increase, indicating the need of greater precautions for the control and elimination of these forms through increased attention in the rat proofing of upper stories.

The average daily rat catch for the entire field has now fallen below 200 rats per day, notwithstanding the inclusion of a considerable amount of new territory not previously trapped and not yet the subject of rat proofing. It is anticipated that further reductions will be very slow, the residual rodent population being dependent upon the seeking out of small and obscure harborages, removed only through painstaking and intensive rat-proofing methods, these harbors at present affording, through multiplication of contained rats, an irreducible supply.

RAT PROOFING.

During the previous year, in addition to other obstacles to be overcome, there was organized in opposition to rat-proofing measures the so-called taxpayers' association. This organization was ably represented and succeeded in carrying a test case to the supreme court of the State, which declared board of health ordinance No. 17 unconstitutional by reason of certain technical details granting discriminatory authority to the health officer. These objections were promptly corrected in a new ordinance known as commission council series No. 2512, which was drafted and immediately passed. This in turn was carried to the supreme court, where it was upheld in every particular, and under its provisions rat proofing has proceeded in the majority of cases without further difficulty. However, while awaiting such decision, members of the association, and many outside, influenced by the hope of success, delayed important work for many months. With the close of the fiscal year these difficulties have been finally adjusted, the organization has withdrawn all opposition and most of its members have begun alterations seriously delayed for nearly two years.

A further obstacle to success has been the inability of the dock board, through lack of funds, to proceed vigorously with the rat proofing of the wharves of the city. Only a small part of such work has been done, this having been accomplished through the advancement of necessary funds by the steamship companies occupying various wharves. As a result, the Dumaine, Toulouse, and Julia Street wharves have been rat proofed, the Pauline Street wharf and the Stuyvesant docks have been made relatively so, and work of this character is now being carried out at the Girod Street wharf, the floors having been removed and grading begun.

Of interest as showing the value of such rat proofing the following details are included:

The Dumaine and Toulouse Street wharves, occupied by the Southern Pacific and rat proofed, yielded only 11 rats in 6 months, whereas during the same period of time the Bienville Street wharf, adjoining, and non-rat proofed, yielded 136 rats. The rat-proofed Julia Street wharf yielded 18 rats, a very low catch compared with the Girod Street and Poydras Street wharves adjoining, which yielded 583 and 161 rats, respectively.

During the fiscal year 3 plague rats have been obtained directly on or under wharves, namely, Harmony, Westwego, and Bienville, and 15 have been obtained within from 1 to 3 blocks of the river front.

Considering the water front as a whole, the rat catch continues relatively high as compared with the remainder of the city, and in view of the recent exacerbation of the disease and the continued identification of plague rats on or near such wharves, it now seems imperatively necessary that arrangements be finally made for the vigorous prosecution of this work. Its importance has been brought directly to the attention of the governor, and it is believed that early and satisfactory arrangements will result.

During September, 1915, New Orleans was visited by a destructive tropical storm, causing damage variously estimated at from two to five million dollars. Few structures escaped damage, which was confined principally to roofs, necessitating immediate and expensive repairs. This proved a serious blow to both the city itself and to rat-proofing operations. Leaking roofs required immediate attention; there being insufficient funds for both rat proofing and repairs, rat proofing had to wait. For this reason much important work was of necessity postponed.

A summary of operations is as follows:

Recapitulation of rat-proofing operations, New Orleans, La., for fiscal year ending June 30, 1916.

Buildings:		
Completed, rat proofed		52, 717
Incomplete work begun		53, 087
Noncompliant, no work done		14, 317
Originally rat proof, no work required by service		24, 743
Demolished		7, 102
Total number		151, 966
Work performed:		
Square yards concrete laid		521, 167
Linear feet chain wall installed		959, 762
Linear feet flashing laid		230, 642
Square yards tar-cinder floor laid		18, 643
Linear feet wall fill installed		235, 516
Total cost rat proofing		$2, 059, 033. 12
City blocks	number	5, 305
Main buildings	do	73, 869
Rear buildings	do	78, 097
Inspections, original	do	58, 036
Notices served, original	do	64, 660

	Rat proofed.	Noncompliant.	Total.
Dwellings	36,649	30,940	67,589
Food depots	749	1,816	2,865
Stables	1,552	2,336	3,888
Miscellaneous business buildings	1,828	1,419	3,247
Cisterns	13,422	6,380	19,802
Chicken yards	1,819	5,437	7,256

Garbage cans, number installed		17,894
Premises fumigated, sulphur	number	5
Premises sprayed with pulicide kerosene emulsion	do	14
Rat harbors near plague foci destroyed by removal of wood floors, planking, and elevation of lumber, etc	number	50
Planking removed from open yards, lots, etc	square yards	758,740
Legal cases:		
Acquitted or withdrawn at request of service (rat proofed)	number	1,031
Convicted		357
Appealed		172
Pending June 30		1,181
Amount of fines imposed		$855

Plague Suppressive Measures in California.

The activities of the service at the beginning of the fiscal year were under the supervision of Passed Asst. Surg. J. R. Hurley, who was succeeded on August 7, 1915, by Senior Surg. C. C. Pierce. During the absence of the latter officer from December 16, 1915, to May 20, 1916, Surg. J. S. Boggess remained in charge of service operations. The Federal laboratory was conducted under the direction of Asst. Surg. N. E. Wayson, Surg. D. H. Currie, and Bacteriologist M. T. Clegg, the necessities of the service requiring the relief of the two former officers before the expiration of their tour of duty.

OPERATIONS IN SAN FRANCISCO.

In continuation of the routine of previous years, the work of the San Francisco division may be classified under the following headings:

1. Measures for the destruction of rats. (*a*) Trapping; (*b*) poisoning.
2. Measures for the elimination of rat food.
3. Measures for the destruction of rat harbors and for the permanent rat proofing of buildings.
4. Measures adopted to free shipping of rats.
5. Miscellaneous work of the service.

Measures for the Destruction of Rats.

TRAPPING.

This has been continued throughout the year, as described in previous reports. Prior to November, 1914, a large force, covering the entire city, was constantly employed, but a reduction in the allotment of funds at that time made a curtailment necessary, so that during the present fiscal year the rat work has been considerably restricted. All rats trapped or found dead as a result of the poisoning operations are tagged, in order that their origin may be definitely located, and sent to the service laboratory for post mortem examination. A record is also made for statistical purposes of the sex and species and the character of the premises where found.

The following tabulated statement shows the number and character of premises trapped, number and kind of traps used, and the resultant catch from July 1, 1915, to June 30, 1916:

Character of premises.	Number of premises.	Number of cage traps.	Number of snap traps.	Number of rats trapped.
Stores	49	....	211	3,124
Sewers	34	36	....	1,591
Restaurants	18	....	149	258
Stables	17	....	85	1,148
Dwellings	15	....	53	915
Factories	8	....	59	551
Vacant lots	11	....	75	577
Warehouses	83	....	957	4,418
Water front	32	....	278	1,828
Steamers [1]	16	....	147	1,686
Total	283	36	2,014	16,096

[1] Steamers trapped on 691 times.

POISONING.

During the year poison for rats was placed as in previous years—the arsenic paste and phosphorus being used. Numerous rat complaints and requests for help in rat eradication were received, many of which were temporarily acted upon; in all others advice was given regarding the proper measures required.

The following tables summarize the rat-destructive work for the year, including the species for this year's catch:

Measures for the destruction of rats.

Number of rats trapped	16,096
Number of rats found dead	699
Number of mice trapped	2,991

Remarks.—The number of mice is incidental to the trapping of rats.

Bait used:

Number of pounds bacon	1,040
Number of loaves of bread	985
Number of poisons placed (pieces)	1,928,950
Number of loaves of bread used for poison	5,100
Number of pounds of arsenic paste used	1,164
Number of pounds of phosphorus poison used	1,881

Comparative catch of various species of rats.

Species.	1909	1910	1911	1912	1913	1914	1915	1916.
Norvegicus	78,630	72,613	58.856	46,597	51,140	46,600	8,490	9,594
Rattus and alexandrinus	4,162	10,509	13,429	21,525	19,190	16,856	7,306	7,201
Total catch	82,792	83,122	72,285	68,122	70,330	63,456	15,796	16,795

NOTE.—Since Mus rattus and Mus alexandrinus are practically always trapped in the same localities, and in equal numbers, the catch is consolidated.

RAT ERADICATIVE MEASURES ON THE EXPOSITION GROUNDS.

During the latter part of the exposition period, in October and November, 1915, a considerable number of rat complaints were received by the chief sanitary officer of the Panama-Pacific International Exposition. A few traps were set under various exposition buildings and some poison was placed. The rats and mice caught during October and November were as follows: October, 94 rats and 214 mice, of which number 45 rats and 118 mice were sent to the laboratory, and during November, 92 rats and 133 mice, 35 rats and 56 mice being examined for plague infection. A thorough inspection shortly before the exposition closed on December 4, 1915, disclosed a heavy rat infestation, particularly on the "zone" where the amusement and restaurant concessions were located.

In view of the probability of the rodent population deserting the exposition grounds during the demolition of the buildings and seeking harborage in the adjacent residence and business districts, it was considered advisable to carry on intensive rat exterminative work continuously during the period of removal of the buildings. This subject was taken up by the chief sanitary officer and the exposition authorities readily agreed to furnish the necessary employees and material to have the work carried on under the supervision of a service officer. The post-exposition period rat eradicative campaign was therefore promptly started on December 5, 1915, and continued to June 30, 1916.

An indication of the effectiveness of the work of poisoning rodents is shown by the fact that when one small zone building 16 feet square was destroyed 35 dead rats were discovered under the flooring, none being found plague infected.

The following table gives a summary of the rat destructive work performed on the exposition grounds:

Number of rats trapped	902
Bait used:	
Number of pounds of bacon	243
Number of poisons placed (pieces)	1,530,050
Number of loaves of bread used for poison	4,891
Number of pounds of arsenic paste used	936
Number of pounds of phosphorus poison used	1,700

MEASURES FOR THE ABOLITION OF RAT FOOD.

Garbage and all foodstuffs, including grain and other food for miscellaneous domestic animals, when improperly stored or handled, constitute nuisances and are available rat food, serving to attract as well as nourish rodents. All complaints regarding alleged nuisances of this character, whether received directly or by routine reference from the city health office, are investigated and appropriate action taken to abate the condition. During the year 2,550 complaints were received, all of which were investigated and the responsible parties notified regarding proper measures for abatement.

As in previous years a large proportion of rat food is accessible on account of defective garbage cans. A city ordinance requires that all garbage cans be inspected and approved by the board of health, but obtaining cans from the garbage collector has become an established custom which it is difficult to discontinue. These scavengers in many cases supply cheap and defective cans from which the garbage can be removed by rats, thus becoming an important factor favoring the increase of rodent population.

The following tables show the work done in investigating complaints and in preventing rats from obtaining food:

Complaints referred from city health department and from other sources investigated from July 1, 1915, to June 30, 1916.

Rat complaints	692
Manure and stable complaints	173
Chicken, rabbit, pigeon, etc	396
Garbage and defective garbage cans	365
Rubbish complaints	204
Plumbing complaints	86
Insanitary premises, including shacks	311
Stagnant water	8
Goat, dog, and cat nuisance	90
Fly complaints	33
Mosquito complaints	107
Flea complaints	5
Swine complaints	16
Miscellaneous	64
	2,550

Measures taken for the destruction of rat food.

Number of premises inspected	57,999
Number of nuisances abated	14,738
Number of complaints investigated	2,375
Number of garbage cans installed	3,154
Number of chicken yards abandoned	298
Number of chicken houses concreted (square feet, 2,170)	18
Number of chickens, pigeons, rabbits, etc, disposed of	4,486
Number of premises screened	668
Number of toilets screened	379
Number of notices served	5,787
Number of plumbing complaints referred to board of health	100
Number of vacant lots cleaned	839
Number of basements cleaned	336
Number of yards cleaned	718
Number of premises cleaned of rubbish	446
Number of plumbing nuisances abated	62
Number of lots from which stagnant water has been pumped	11
Number of garbage cans inspected and stamped approved	26,183

MEASURES TAKEN FOR THE DESTRUCTION OF RAT HARBORS.

It was mentioned in the report for the last fiscal year that a great many passageways, yards, areaways, and sidewalks remained, forming ideal harborage for rodents. The removal of wooden flooring on such spaces has been continued during the present year, the results accomplished being shown in the following table, which also includes the work done to render stables rat proof:

Number of floors torn up	1,437
Number of basements torn up	324
Number of yards torn up	279
Number of passageways torn up	290
Number of sidewalks torn up	84
Number of buildings destroyed	841
Number of premises in which wood was piled off the ground	211
Number of stables destroyed	88
Number of stables vacated	58
Number of stables concreted (square feet, 85,855)	55
Number of stables cleaned	30
Number of manure bins installed	44
Number of feed bins installed	13

MEASURES FOR THE PERMANENT RAT PROOFING OF NEW BUILDINGS.

The service has continued its cooperation with the city board of health in enforcing the rat-proof construction requirements of new buildings in accordance with the municipal ordinances. The board of public works has, as heretofore, furnished copies of all applications for building permits, so that the inspectors could enforce rat proofing during construction.

The following table shows the work done in rat proofing new buildings:

Number of new buildings rat proofed	1,933
Number of basements concreted (square feet, 2,242,424)	2,518
Number of floors concreted (square feet, 1,499,902)	744
Number of yards concreted (square feet, 244,037)	1,086
Number of passageways concreted (square feet, 298,961)	2,031
Number of sidewalks concreted (square feet, 1,098,559)	1,283
Total number of square feet laid in new premises	5,383,883

RAT PROOFING OF FOOD PLACES.

A large part of the permanent rat-proofing work has been of food places in accordance with the city ordinance of 1914, which provides among other things that before any business connected with the preparation or handling of foodstuffs can be commenced, the sanitary condition of the premises to be occupied must be satisfactory to the board of health. Under this requirement rat proofing of such places is enforced. Activities in regard to food places were limited to new establishments and to old premises about which complaints were received.

The following table shows the number of buildings inspected, number abated, and the work accomplished from July 1, 1915, to June 30, 1916, under the new ordinance regulating the sale, handling, and manufacture of foodstuffs:

Number of food places applying for health officer's certificate, inspected, and requirements sent	1,452
Number of buildings rat proofed by concreting	622
Basements concreted (square feet, 25,525)	27
Floors concreted (square feet, 346,428)	551
Yards concreted (square feet, 6,380)	19
Passageways concreted (square feet, 3,275)	16
Total square feet concrete laid	381,608
Number of area walls installed (cubic feet, 41,874)	165
Number of buildings rat proofed by area walls and wire cloth (square feet, 249,191)	223
Premises screened	518
Toilets screened	280

RAT PROOFING IN THE FIRE LIMITS AND REPAIRS TO OLD BUILDINGS.

The work of maintaining the rat proofing of buildings within the fire limits has been continued, as in past years. These fireproof buildings are practically rat proof, but unless constant attention is given to basement windows, openings around pipes, ventilators, sidewalk gratings, doors, and unused flues, etc., such buildings gradually become rat infested. When old buildings are undergoing repairs, the nature of such repairs is regulated so as to increase the rat exclusion efficiency of the building in question. The work accomplished by these measures is tabulated as follows:

Buildings in fire limits rat proofed.

Buildings abated	611
Ventilators on roofs screened	39,555
Ventilators in basements screened	27,635
Unused chimney flues screened	9,847
Windows screened	10,265
Sidewalk gratings screened	26,009
Lens lights replaced	55,660
Doors rat proofed	416
Inclosed dead spaces opened up	1,379
Openings around pipes closed with cement	46,761
Conduits closed with cement	3,956
Openings in walls, ceilings, and floors closed by wire, lath, and cement	84,460
Floors complying with section 199 (wire cloth) (square feet, 87,994)	67
Wood floors removed (square feet, 100,182)	51
Floors concreted (square feet, 807,027)	338
Finished ceilings removed from basements (square feet, 17,761)	19

Existing nonrat-proof buildings repaired, using rat-proof materials.

Number of buildings rat proofed by concreting	3,310
Basements concreted (square feet, 1,126,481)	1,162
Floors concreted (square feet, 1,345,210)	1,324
Yards concreted (square feet, 149,994)	456
Passageways concreted (square feet, 162,561)	1,179
Sidewalks concreted (square feet, 473,329)	1,409
Stables concreted (square feet, 85,855)	55
Chicken yards concreted (square feet, 2,170)	18
Total number square feet laid in old premises	3,345,600
Number of area walls installed (cubic feet, 275,700)	1,448
Number of buildings rat proofed by area walls and wire cloth (square feet, 249,191)	223

As in previous years the service has assisted the city board of health in its condemnation proceedings by collecting evidence, and testifying at the hearings before the board, prior to issuing the order to repair, vacate or demolish the building in question. In most cases the necessary repairs and changes in construction are made, so as to avoid demolition of the building.

The amount of work resulting from this activity is shown in the following tabulation:

Number of buildings submitted to board of health for condemnation	242
Number of buildings acted on by board and condemned	193
Number of buildings acted on by board, but not condemned	103
Number of buildings recommended for condemnation, but not yet heard by the board	28
Number of buildings given rehearings by the board	440
Number of buildings abated following condemnation proceedings	357
Number of buildings condemned and remaining unabated[1]	194

FREEING SHIPS FROM RATS.

As in previous years, this office has assisted the San Francisco quarantine station, located on Angel Island, by supplying and directing an inspection and trapping force, operating on vessels in port, wharves, and property immediately adjacent thereto. The foreman in charge of this work sees that all lines from vessels to wharves and lighters are provided with effective rat guards, and makes a special inspection of cargo from ports suspected of having plague infection.

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[1] These include some buildings condemned during previous years, hence the totals will not balance.

Trapping of rats on vessels is done to decrease the chances of such rats as may be present coming ashore. All rats so secured are sent to the service laboratory for examination for plague infection. No infected rats have been found during the past year.

The following table gives the data for work of this kind during the fiscal year:

Number of inspections made of vessels for rat guards	1,079
Number of vessels inspected for rat guards	338
Number of reinspections made of vessels	1,292
Number of new rat guards procured	736
Number of defective guards repaired	580
Number of vessels in which cargo is inspected	17
Number of pieces of cargo inspected for rat evidence	9,296
Number of rats trapped on wharves and water front	1,838
Number of rats trapped on vessels	1,625
Average number of traps set on wharves and water front	194
Average number of traps set on vessels	86
Number of vessels trapped on	128
Number of times trapped on	691
Number of poisons placed on water front (pieces)	187,200
Bait used on water front and vessels, bacon (pounds)	301
Amount of bread used in poisoning on water front (loaves)	516
Number of pounds of poison used on water front	225

REMARKS.

At the close of the present fiscal year the service arranged to turn over the special sanitation work in San Francisco to the city board of health, as no plague infected rats have been found since October 23, 1908. The city board of health has provided for the continuance of the work along the same lines as have been followed for the past eight years. The continuance of rat eradicative measures by the local authorities is necessary in San Francisco, as it is in all large seaports, to make the city immune to plague invasion. Although extensive operations have been carried on for the past eight years, rat complaints are constantly being received, a large proportion of which are caused by rats coming from sewers. This is significant when taken in connection with the fact that during the past intensive work, sewers contributed on an average three times the number of rats caught in all other localities, indicating the urgent need for the continuation of general poisoning and trapping, especially of sewers.

The service officer in charge of plague eradicative measures in California, dealing principally with ground squirrel eradication, will continue to cooperate with the city board of health in an advisory capacity and will assist in the enforcement of rat-proof requirements and condemnation proceedings, but the responsibility and expense of continuing the work rests upon the local health authorities after July 1, 1916.

Operations for the Eradication of Plague Among Ground Squirrels.

For many years past it has been the constant endeavor of those in charge of plague eradicative measures in California to maintain a "squirrel-free" zone immediately to the east of Berkeley, Oakland,

and Alameda. The object of this was to prevent the exchange of plague infection from squirrels to rats in the cities named, or vice versa. As mentioned in last year's report, this zone was not intensively worked during 1915, as no plague-infected rats had been found in San Francisco or Oakland for several years and no infected squirrels had been found in the zone area for nearly three years. During July, 1915, one plague-infected squirrel was found on the "free" zone east of Berkeley. Intensive squirrel eradicative operations were immediately carried out in the vicinity where this infected squirrel was obtained and also over a large area of land badly infested with rodents in Contra Costa County to the east of the zone. Similar work was carried out over a large area of land that had been subdivided into small building lots located in this belt.

During the present hunting season, since April 1, 1916, seven plague-infected squirrels have been found near Richmond and one near Hayward, both places being in the zone that should be kept free of squirrels. The finding of this infection in squirrels so near to the bay cities has made it imperative to continue the campaign in an intensive manner for an indefinite period and will necessitate an increase in the force employed until plague infection among ground squirrels is finally eradicated. The question of rat eradication in all the bay cities has been taken up with local health officers and the municipal councils, all of whom have promised to carry out rat eradication.

INSPECTION OF LANDS FOR SQUIRREL INFESTATION.

The same method of inspection operations that has been in force for the past several years was continued during the fiscal year. A supervising inspector is stationed in each county where this work is being done, and under his jurisdiction are assigned as many field inspectors as can be employed with the funds available. It is desirable to have the territory covered by each field inspector not greater than 40,000 acres, and in many cases where the lands are divided into small holdings even this area is too great to be thoroughly covered by one man.

Under an act of the California Legislature, approved June 7, 1913, it is mandatory upon the landowner to eradicate the squirrels on his property when directed to do so by an agent of the State board of health. All of the field inspectors are authorized to serve notices of this character. In case the owner of the property on whom such notice is served fails to institute the necessary squirrel eradicative measures within 10 days from date of service, employees of the State board of health, working under the direction of the service officer in charge of plague suppressive measures, are sent on the property, and the cost of labor and materials used in eradicating the squirrels are charged to the landowner. This bill can be collected from the county board of supervisors by the State board of health and then becomes a lien on the property.

It was necessary, during the year, to proceed in this manner on 29,678 acres of land, the total cost of this work being in most cases repaid direct to the State board of health by the property owner.

This amount reverts to the State fund for "Investigation and suppression of contagious and infectious diseases" and can be re-expended for squirrel eradication. Old accounts from previous fiscal years, amounting to $7,625.32, were turned over to the State board of health so that legal proceedings could be taken to enforce payment.

Property owners can be compelled to eradicate squirrels only in those counties that have been declared to be infected areas by the State board of health, at present the following counties being included in this list:

Contra Costa, Alameda, Santa Cruz, Santa Clara, San Benito, Monterey, Merced, Stanislaus, and San Joaquin.

Inspection work was not carried on by the service in Santa Cruz, Santa Clara, Merced, or San Joaquin Counties during the present fiscal year on account of the lapse of time since plague-infected ground squirrels had been found in these counties and from the fact that the supervisors were unwilling to give the work the necessary financial support. The number of infected squirrels and the date of finding the last infection, prior to April 1, 1916, in each of the four counties are shown in the following table:

County.	Number infected squirrels found.	Date last infected squirrel found.
Santa Cruz	3	May 17, 1910
Santa Clara	25	July 23, 1913
Merced	5	July 12, 1911
San Joaquin	18	Aug. 26, 1911

As has been mentioned in previous annual reports, considerable economic benefits result from ground-squirrel eradication, and for this reason alone many property owners cooperate with the service in attempting to eradicate squirrels on their lands. In many of the counties, however, large tracts of practically worthless lands are found, some of this being public property and some owned by absentee landlords. This class of land offers a difficult problem to handle. If it is left alone, squirrels breeding thereon reinfest adjoining areas where eradicative measures have been carried out. No satisfactory provision has ever been made for eradicating the squirrels found on these lands.

HUNTING OPERATIONS.

Shooting of squirrels for examination in the laboratory is necessary to determine the location and extent of infection. At the beginning of the fiscal year infection was known to exist on 171,517 acres, to which should be added 98,320 acres of land immediately adjoining or surrounding the infested area, making a total of 269,837 acres requiring intensive squirrel eradicative measures to destroy and prevent the migration of infected rodents. Such measures were carried out on all the lands remaining from the previous year.

Hunting operations were carried on in certain locations during nearly the entire year. At the beginning of the hunting season of this year—April 1 and continuing until June 30, 1916—a largely increased force of hunters was put into the field, and during these three months 83 infected squirrels were found.

At the close of the last fiscal year the only two counties that were known to harbor plague infection were Contra Costa and San Benito. To these two counties there must now be added the six additional ones shown in the table given below, as plague-infected squirrels have been found in eight counties during the year ended June 30, 1916.

Ranches on which plague-infected squirrels have been found from July 1, 1915, to June 30, 1916	69
Ranches hunted over during fiscal year	5,863
Number squirrels shot	63,913
Number squirrels found dead	336
Total squirrels shot and found dead	64,249
Number squirrels examined	63,598
Number squirrels found infected with plague	138

The 138 infected squirrels mentioned in the preceding table were found as follows:

Ranch.	Infected squirrels.	Date last infected squirrel found.	Total.
Alameda County:			
Peoples Water Co	1	July 12, 1915	
Oscar Meyer ranch	1	May 22, 1916	
M. J. Crocker estate	2	June 21, 1916	
Thomas Egan ranch	1	May 29, 1916	
J. A. Mulqueeney ranch	1	June 7, 1916	
H. C. Peterson ranch	1	June 23, 1916	7
Contra Costa County:			
Peoples Water Co	10	June 29, 1916	
Alexander ranch	2	July 31, 1915	
Silva ranch	1	do	
Domingo ranch	4	Aug. 12, 1915	
J. Lynn ranch	2	Sept. 13, 1915	
Mulholland ranch	1	Aug. 17, 1915	
M. Duarta ranch	1	do	
Root ranch	1	Aug. 16, 1915	
J. M. Pereira ranch	1	Aug. 23, 1915	
J. Christen ranch	1	Aug. 30, 1915	
T. Silva ranch	2	Apr. 20, 1916	
C. Belshaw ranch	1	Sept. 1, 1915	
W. Noakes ranch	1	Sept. 10, 1915	
T. E. Chadburne ranch	1	Oct. 28, 1915	
Vivian ranch	2	Nov. 12, 1915	
Lacassie ranch	2	May 30, 1916	
Griffith ranch	2	May 10, 1916	
H. Kellar ranch	1	Apr. 28, 1916	
J. Noria ranch	1	May 1, 1916	
Southport Land & Commercial Co	3	June 27, 1916	
F. Abrott ranch	1	May 16, 1916	
Fernandez estate	9	May 29, 1916	
Mortimer ranch	1	May 28, 1916	
Donovan ranch	1	May 20, 1916	
Stine ranch	1	May 29, 1916	
Kofford ranch	1	June 15, 1916	
Crocker and Dillon estate	1	June 17, 1916	
Abrams Bros	1	June 26, 1916	
J. Harding ranch	2	June 28, 1916	58
Merced County:			
Crocker-Huffman property	2	May 12, 1916	2
Santa Clara County:			
Pacheco Pass	1	Mar. 29, 1916	
J. Heinlan ranch	2	May 29, 1916	
Cochran ranch	2	May 24, 1916	
A. Brassey ranch	1	May 31, 1916	
J. Bodeau ranch	1	June 21, 1916	
San Mateo County:			
H. Selby ranch	1	do	1
Sanat Cruz County:			
Edward White ranch	1	Apr. 28, 1916	2
G. F. Silliman ranch	1	May 30, 1916	7

Ranch.	Infected squirrels.	Date last infected squirrel found.	Total.
Monterey County:			
M. Johnson ranch	11	Apr. 13, 1916	....
Raymond ranch	3	Mar. 2, 1916	....
C. Herbert ranch	5	Apr. 1, 1916	....
Otto Olsen ranch	4	Apr. 12, 1916	....
Wiley Bros. ranch	1	Mar. 22, 1916	....
S. Dedina ranch	1	Apr. 3, 1916	....
Peach Tree ranch	1	Apr. 18, 1916	....
J. Girard ranch	1	.....do......	....
San Lorenso or Topo ranch	5	May 27, 1916	32
San Benito County:			
D. J. Watson ranch	3	Apr. 20, 1916	....
L. J. Abrams ranch	4	July 15, 1915	....
Abrams and Brandt	2	July 26, 1915	....
Frusetta ranch	1	Aug. 14, 1915	....
H. Waters ranch	1	Apr. 10, 1916	....
H. Kruse ranch	2	Apr. 26, 1916	....
P. Freis ranch	1	Apr. 24, 1916	....
Lee Payne ranch	1	Apr. 27, 1916	....
V. B. Oldham ranch	2	May 26, 1916	....
L. M. Egan ranch	1	May 16, 1916	....
Marcus ranch	1	May 17, 1916	....
H. and L. Matthews ranch	1	May 24, 1916	....
A. Cowden ranch	1	May 27, 1916	....
G. Wapple ranch	1	June 2, 1916	....
D. D. Sindell ranch	6	June 30, 1916	....
Garcia ranch	1	June 26, 1916	29
Total for year	....	....	138
Total number of ranches infected	....	....	69

The finding of 138 infected squirrels during this fiscal year, 83 during the last three months of the year, varies from the results of the four previous seasons, during which a constant decrease in the number of squirrels found and in the per cent infected with plague was noted, as shown in the following table:

Summary of hunting operations for the period Apr. 1 to June 30, 1912–1916.

	1912	1913	1914	1915	1916
Ranches hunted over	723	990	1,464	1,902	3,787
Number of squirrels shot	19,335	16,186	13,162	15,594	44,751
Hunters engaged (average)	9	17	21	26	46
Average days each man hunted	64.4	49.4	57.2	59.5	51
Squirrels per hunter per day	33.3	19.2	10.5	7.6	12
Squirrels shot per ranch	26.7	16.3	8.5	8.1	11.8
Infected squirrels shot	506	283	44	10	83
Per cent of squirrels infected	2.61	1.74	.34	.05	.18

SUMMARY OF HUNTING OPERATIONS, APRIL 1 TO JUNE 30, 1912–1916.

Intensive hunting operations on a large scale and over a wide area were carried out during the present hunting season for the purpose of a final survey before definitely and permanently discontinuing the work in those counties in which infected squirrels could not be found. If infected squirrels had not been discovered this year, in other than Contra Costa and San Benito Counties, where infection was known to exist, it was intended to discontinue all work in the remaining counties and concentrate the entire force in the two infected districts in an attempt to finally eliminate plague infection among ground squirrels. The finding of plague infection in eight counties, however, has had the opposite effect and during the coming fiscal year it will be necessary to continue the work in all of these infected areas; this will result in greatly increasing the funds required for plague eradicative work in California. The finding of a plague-infected squirrel in San Mateo County is of particular significance. This is the first infection to be found in this county, which immediately adjoins San Francisco to the south, on the peninsula, making this focus a source of great danger to the city itself. Immediate steps were taken to carry out intensive eradicative work in the district just south of San Francisco to prevent the interchange of infection between squirrels and rats.

HUNTING IN OTHER PARTS OF THE STATE.

In addition to the hunting operations carried on in the 10 counties that have been mentioned above, six hunters were sent to Modoc and Lassen Counties, in the northeastern part of the State, during January, 1916, and remained there until the end of the fiscal year. No plague-infected squirrels were found in these two counties. The employees on this duty cooperated with the California State Board of Health, the United States Biological Survey, the Forest Service, and others interested, in preventing the introduction of rabies from adjoining States and in limiting its spread in California. Poisoning and trapping operations were carried out in these counties during the winter to destroy coyotes, and a rodent survey for plague-infected squirrels was made in the spring. A résumé of the cooperative rabies work is given in another part of this report.

Hunting was also done in Mendocino, Sonoma, Lake, Kern, and Madera Counties, Cal., during June, 1916, as a result of reports from these counties that ground squirrels had been found dead and living ones observed to act strangely, becoming gentle and apparently not possessing their usual activity. No plague infection was found among squirrels in the five counties mentioned.

HUMAN CASES OF PLAGUE.

From 1908 until June 30, 1916, 14 human cases of bubonic plague have occurred in California, contracted from infected ground squirrels. One of these cases occurred during July of the present fiscal year, in the Moraga Valley, Contra Costa County, death resulting. The diagnosis was confirmed by animal inoculations. This particular case may have contracted his infection from rats or fleas, as the patient gave a history of having slept on some straw near the railroad station at Moraga where rat evidence was found. As the case occurred in the rural districts, most probably the infection was acquired from ground squirrels. Intensive rat and squirrel eradicative measures were carried out in this vicinity; no other cases have occurred.

SQUIRREL ERADICATIVE MEASURES.

Inspection and hunting operations are only preliminary to the real aim of the service—the eradication of plague infection among ground squirrels in California and the prevention of the disease in man. This is a very important and difficult duty, tremendous in its extent.

Many landowners in noninfected parts of the State desire work done to eradicate squirrels on account of the economic benefits to be derived. This, of course, is not a public health measure, and only advice is given in such cases. To exterminate squirrels in the infected areas is practically impossible, but by intensive work during a long period of time it is believed that plague infection may ultimately be stamped out. The work accomplished during the past fiscal year may be summarized as follows:

Eradicative operations.

Number of inspections	1,604
Number of reinspections	7,786
Number of acres inspected	480,197
Number of acres reinspected	2,832,972
Number of acres treated with waste balls	100,078
Number of acres treated with destructors	16,731
Number of acres treated with poisoned grain	713,600
Railroad rights of way:	
Number miles inspected and treated	126
Number of miles reinspected and treated	318

REMARKS.

The experience of the past six years proves that it is possible to greatly reduce the number of ground squirrels in certain areas by intensive poisoning and other destructive measures. It also shows that it is impossible to predict a definite time during which plague infection among squirrels may be eradicated. With the expenditure of considerable money and the continuance of the work for an indefinite period, it is thought that this end can be accomplished. It is believed that the work should be continued until at least two years have passed without finding plague infection upon the examination of thousands of squirrels secured from the entire area of previously known infected territory.

LABORATORY OPERATIONS, SAN FRANCISCO, CAL.

During the year the laboratory has been transferred from Army and De Haro Streets to its present location, 200 Duboce Avenue.

The routine examination of squirrels, rats, and other rodents for the presence of plague has been continued. During the last three months of the fiscal year there has been a marked increase in the number of infected squirrels sent to the laboratory. The predominant lesions occurred in the cervical and inguinal glands. A very few squirrels showed lesions in other organs, but in no instance was there a general infection or septicemic condition. It is of interest to note that in a large number of plague squirrels where purulent glands only were found, guinea pigs inoculated with material from the spleen did not develop the disease, whereas those inoculated with pus from the gland invariably died, and pure cultures of *B. pestis* were obtained from the organs of the inoculated animal.

In the course of the examination of rodents for plague a number of rabbits were found to be infected with *B. tularense*, an anatomically plaguelike disease, first described by Surg. G. W. McCoy, occurring in ground squirrels. Dr. William B. Wherry (Public Health Reports, Dec. 18, 1914) later found this microorganism to be the cause of extensive epizootics among wild rabbits in Kentucky and Indiana.

The following table shows the number of rodents received and examined for plague during the year:

Rodents.	Received.	Examined.	Infected.
Squirrels	64,249	63,598	138
Rats	17,906	16,293	None.
Other animals	3,235	463	None.

EXPERIMENTAL WORK.

The effects of strychnine sulphate upon the California valley quail were studied and the findings published in the Public Health Reports for December 10, 1915. This alkaloid has had an extensive use in the eradication of ground squirrels, and at various times the effect which grain poisoned by this substance might have upon valley quail has been questioned. Accordingly experiments were conducted to determine the minimum lethal dose of strychnine for quail and the amount producing toxic symptoms under natural conditions. It was found that quail are relatively insusceptible to strychnine and that under natural feeding conditions there is no mortality from this cause.

A comparative study of the efficacy of brilliant green agar, as advised by Krumwiede, Pratt, and McWilliams (Journal Infectious Diseases, vol. 18, No. 1), and Endo's media for the isolation of *B. typhosus* from stools was made. In a number of instances the brilliant green proved superior to the Endo media.

Experiments were also carried on to determine the length of time *B. typhosus* remained viable when planted with feces from typhoid patients in Krumwiede's brilliant green media containing 1 per cent agar. The organism was readily isolated after 48 hours. The object of this experiment was to devise a method by which cultures could be made from suspected typhoid patients and carriers at a distance from the laboratory. This media, containing 1 per cent agar, is of semisolid consistency and can be placed in a small shell vial. These vials are then mailed in double containers, such as is used by the United States Public Health Service, to the place where the cultures are to be made. There they are inoculated with from 1 to 2 grams of feces and returned by mail to the laboratory.

Certain experiments with pediculus vestimenti, received from Senior Surg. C. C. Pierce, on special duty at the Mexican border, were performed during the year. A number of lice collected from typhus patients and normal persons were macerated and injected into guinea pigs, while sections were made and examined of others. The results of the guinea pig inoculations were negative, and no definite conclusions could be made from the sections examined.

Experiments were made to determine a numerical relation between the quantity of bleaching powder necessary to sterilize a solution of organic matter and its oxygen-consumed value. A solution of peptone was used, and it was found that the amount of chlorine required varies according to the oxygen-consumed value of the organic matter.

Research work which remains uncompleted relates to the possible use of glycerine for delayed examination of water, with especial reference to its inhibiting value for the growth of *B. coli* and attempts to infect *Mus norvegicus*, after a continuous diet of salt fish, with *B. lepra.*

ASSISTANCE TO OTHER BRANCHES OF THE SERVICE.

Clinical work has been performed for the following institutions: United States Marine hospitals, San Francisco, Los Angeles, Portland, Oreg., Port Townsend, Wash.; United States Immigration Hospital, Angel Island, San Francisco, Cal.; Panama-Pacific International Exposition Hospital; United States Indian Service—Randlett, Utah; Laguna, N. Mex.; Shoshone, Nev.; Valentine, Ariz.; Supai, Ariz.; Phoenix, Ariz.

The work consisted mostly in making the Wassermann reaction and the examination of stools for the presence of *B. typhosus.* Two antigens are always used in performing the Wassermann test, the alcoholic extract of heart muscle and the alcoholic extract of heart muscle fortified with four-tenths per cent cholesterin. In a number of instances good positives were obtained with the cholesterin antigen, whereas the same serum gave negative results with the ordinary alcoholic extract. All of the patients whose serum gave a positive reaction with the former and not with the latter gave a positive history and improved under specific treatment. This would indicate that in our work the cholesterin antigen is a more sensitive antigen and is not a nonspecific one.

A summary of examinations made is as follows:

Wassermann tests	639
Feces for the presence of *B. typhosus*	39
Blood for typhoid (Widal)	48
Bacteriological examination of milk	4
Feces for intestinal parasites	5
Spinal fluids	8
Gastric analyses	8
Sputum for tubercle bacilli	5
Aid in the diagnosis of suspected human plague cases	5
Urine analysis (complete)	4
Rabies (coyote)	1
Histological	3
Autogenous vaccine	2
Water examinations	29

PLAGUE SUPPRESSIVE MEASURES AT SEATTLE, WASH.

All plague suppressive and plague preventive measures on Puget Sound are under the supervision of the Public Health Service, and Surg. B. J. Lloyd has been continued in charge.

Plague was discovered in Seattle, Wash., in the fall of 1907, a total of seven cases having been reported during October of that year. In the latter part of December, 1913, a death occurred in Seattle which was suspicious of septicemic plague, but the body was embalmed before an opportunity for examination had been obtained and a positive diagnosis could not be made.

The first infected rat was found November 7, 1907, and from time to time others were discovered until September 26, 1908. There was then a break in the continuity of infected rodents for nearly 17 months, when on February 8, 1910, an infected rat was obtained.

Another lapse of more than a year followed, the next infected rat being picked up on August 25, a second on September 20, and a third on September 25, 1911. It is interesting to note that the rat found on September 20, 1911, was taken within two blocks of where the one which was found 17 months before had appeared. After this there was an interval of nearly two years, until September 29, 1913, before another infected rat was discovered, but during the fiscal year ended July 30, 1914, 40 plague-infected rats were obtained. For the fiscal year ended June 30, 1915, 12 infected rats were found in Seattle, while during the past fiscal year the number has diminished to 3.

Trapping operations in Tacoma and Everett, Wash., have revealed no infection.

Vessels calling at Seattle are inspected from time to time, and if rodent conditions are found unsatisfactory they are fumigated. In addition to this a considerable number of vessels are given partial pratique by service officers at Astoria, Port Townsend, and San Francisco, and these are fumigated at Seattle after discharge of cargo.

Fending and rat guarding have been continued as during previous years, foreign and interstate vessels being required to fend and guard at all times. Local vessels are required to fend and guard at night only. The measures applied to these vessels are under the supervision of the service officer in his capacity as deputy state health officer.

The campaign of intensive trapping, in which the citizens cooperate, has been continued in the plague-infected district. The last plague-infected rat was found November 30, 1915.

Summary of plague-suppressive measures at Seattle, Wash.

New buildings inspected	1,049
New buildings reinspected	1,684
Floors concreted, new buildings (square feet, 1,473,918)	708
Basements concreted, new buildings (square feet, 946,141)	773
Yards concreted, new buildings (square feet, 151,946)	245
Sidewalks concreted (square feet)	360,795
Total concrete laid, new structures (square feet)	2,932,800
New buildings elevated	190
New premises rat proofed, concrete	1,481
Old buildings inspected	196
Premises rat-proofed, concrete, old buildings	84
Floors concreted, old buildings (square feet, 146,739)	84
Premises otherwise rat proofed, old buildings	75
Openings screened, old buildings	208
Rat holes cemented, old buildings	650
Wooden floors removed, old buildings	84
Doors rat proofed, old buildings	17
Wire screening used (square feet)	8,470
Buildings razed	115

WATER FRONT.

Vessels inspected	730
Vessels fumigated	84
Sulphur used, pounds	91,545
New rat guards installed	564
Defective rat guards repaired	845
Fumigation certificates issued	84
Port sanitary statements issued	2,332

PLAGUE LABORATORY OPERATIONS.

Dead rats received	989
Rats trapped and killed	16,646
Rats recovered after fumigation	900
Total	18,535

Rodents examined for plague infection	12,818
Rodents proven plague infected	3
Blocks poisoned	33
Poison distributed, pounds	1,042
Bodies examined for plague infection	163
Bodies found plague infected	0
Classification of rodents:	
Mus rattus	962
Mus alexandrinus	3,192
Muse norvegicus	10,543
Mus musculus	3,608
Unclassified	230

MISCELLANEOUS WORK.

Letters sent contractors in re rat proofing of new buildings	782
Letters sent in re rat complaints	252
Boxes of plants arriving from Japan inspected	4,648
Rats trapped and killed in public markets	1,713
Rats trapped and killed on docks	716
Rats trapped and killed in sanitary fills	3,116
Fumigations:	
Vessels fumigated, partial pratique (pounds sulphur, 82,880)	65
Vessels fumigated, local, sulphur free (pounds sulphur, 8,665)	19

Plague preventive measures in other cities.

EVERETT, WASH.

New buildings inspected, including reinspections	250
New buildings, basements concreted (square feet, 75,477)	51
New buildings, floors concreted (square feet, 71,004)	27
New buildings, yards concreted (square feet, 13,401)	43
New buildings elevated 18 inches	73
Total concrete laid, new buildings .... square feet	159,882
Rat-trapping operations:	
Rats trapped and killed	2,773
Rats found dead	50
Total rats received	2,823
Rodents examined for plague infection	2,516
Rodents proven plague infected	0
Classification of rodents:	
Mus rattus	12
Mus alexandrinus	66
Mus norvegicus	2,428
Mus musculus	317

TACOMA, WASH.

(Feb. 28, 1916, to June 30, 1916, inclusive.)

Rodents trapped and killed	1,660
Rodents found dead	56
Total rodents received	1,716
Rodents examined for plague infection	1,681
Rodents proven plague infected	0
Classification of rodents:	
Mus rattus	21
Mus alexandrinus	23
Mus norvegicus	1,666
Mus musculus	6

Rocky Mountain Spotted Fever Investigation and Eradication.

Field investigations.—The field investigations of the distribution and spread of Rocky Mountain spotted fever throughout the 10 Rocky Mountain and Pacific coast States in which the disease has been discovered, were continued during 1916 in cooperation with the health agencies of the different States. Two officers, Surg. L. D. Fricks, in charge, and Asst. Surg. Liston Paine have been detailed to this duty.

The most important results of the investigations reported during 1915 were the abrupt and extensive spread of the disease into southeastern Montana, the invasion of a heretofore uninfected State, South Dakota, and a further smaller extension, investigated at the request of the Commissioner of Indian Affairs, across the Deschuttes River, on the Warm Springs Indian Reservation in northern Oregon.

In contrast to this extension of spotted fever of the previous year the most important observation bearing upon the prevalence of the disease made during the present season has been the marked reduction of cases reported from certain territory, for many years recognized as foci of infection, along the Snake River Valley in Idaho. Heretofore this valley has been considered the center of Rocky Mountain spotted fever infection. The reduction of case incidence from certain localities in this region has been progressive and so pronounced that it can hardly be considered accidental, and it has occurred without any special effort having been made to control the disease, other than the changes and alterations which have followed the rapid development of the entire section. During the season of 1915 an officer of the service was detailed to make an investigation of the influence of live-stock movement, sheep grazing, and other factors which might have a bearing on the extension or the restriction of the disease in this territory.

Quarantine regulations.—The accumulated data bearing upon the spread of Rocky Mountain spotted fever indicate that the disease is disseminated by means of infected adult ticks attached to large animal hosts during the spring and early summer months. In the migrations and movements of domestic animals the attached ticks are frequently and necessarily carried many miles by their hosts, and if the ticks are infected, may originate foci of infection in other localities. The extension and dissemination of the disease are in part accounted for in this manner. In order to prevent this spread, particularly by domestic animals, a regulation was promulgated and incorporated as a part of the Interstate Quarantine Regulations, as approved by the Secretary of the Treasury January 15, 1916, prohibiting the interstate shipment of live stock from infected territory during the season from March 15 to June 15 unless previously freed from all ticks. The regulation provides that common carriers shall not accept for interstate shipment, and no person shall offer for interstate shipment, any cattle, horses, sheep, goats, elk, deer, or hogs originating in a locality where Rocky Mountain spotted fever is known to exist, unless said shipment is accompanied by a certificate from a Federal, State, or local health authority, or an inspector of the Bureau of Animal Industry of the United States Department of Agriculture, or a State veterinarian or his deputy, stating that the said animals are free from all attached wood ticks, or have been freed thereof by hand picking, spraying, or dipping in a disinfectant solution of sufficient strength and for a sufficient time to kill all ticks attached to said animals, such hand picking, spraying, or dipping to be accomplished immediately prior to leaving infected territory. It is expected that this regulation will in large part prevent the dissemination of ticks conveyed through the ordinary transportation channels and will ultimately have considerable influence in preventing the further extension of the disease.

Eradication.—In connection with the field investigations of Rocky Mountain spotted fever efforts toward the eradication of the disease from the Bitter Root Valley, Mont., were continued during the year, the methods employed being as follows: (1) Education of the people concerned as to the mode of transmission of the disease, the consequent danger from tick bites, and the precautions which should be taken for their prevention. (2) Efforts to secure from the State authorities the enactment of proper laws and regulations restricting the grazing of horses and cattle on the west side of the Bitter Root Valley. This has been urged for three years, or since it was determined that the dipping of these animals was inadequate for proper tick destruction. Certain regulations have been passed, but a stronger law is required. (3) Tick destruction: The methods employed in tick destruction during the present year have been: (*a*) Dipping and hand picking of domestic animals. (*b*) Eradication of small wild animals. (*c*) Sheep grazing.

The practical difficulties in the way of eradicating Rocky Mountain spotted fever from the Bitter Root Valley by the dipping of domestic animals alone have been previously reported. These are, the location and the brief period of attachment on their hosts of the adult tick, *Dermacentor andersoni;* the fact that immature forms of the tick do not attach to animals which are dipped and the unfavorable weather conditions existing in the valley during the early spring months, at which season the ticks are most voracious. The present season emphasized the correctness of these observations. Because of prolonged cold weather the regular dipping of live stock was impossible, and it was necessary to depend to a great extent on hand picking the ticks from domestic animals at short intervals. Where animals are numerous this procedure is both laborious and unsatisfactory, and for this reason it has been strongly recommended to State officials that the grazing of horses and cattle on the tick-infested territory of the west side of the valley be prohibited, exception being made of a limited number of milk cattle and work stock commensurate to the needs of each resident family.

The following comprises a list of the live stock in the three tick districts, covering an area of approximately 60 square miles, together with the treatment employed in each instance for the eradication of ticks:

Victor district: Cattle, range, 245; cattle, pasture, 216; total, 461. Horses, range, 34; horses, pasture, 30; total, 64. Sheep, four small bands; total, 260.

Treatment: Cattle dipped, 541; hand picked, 341. Horses dipped, 116; hand picked, 26. All sheep were examined at intervals for live wood ticks, but none were found.

Hamilton district: Cattle, range, 83; total, 83. Horses, range, 38; horses, pasture, 14; total, 52. Goats, pasture, 130; total, 130. Hogs, pasture, 30; total, 30. Sheep, three small bands; total, 100.

Treatment: Cattle dipped, 103; hand picked, 112. Horses dipped, 88; hand picked, 4. Goats dipped, 130. Hogs dipped, 60. The sheep were examined for wood ticks and a small percentage of live ticks were found on one band, recently introduced on to heavily infested territory.

Gold Creek district: Cattle, range, 288; total, 288. Horses, range, 59; total, 59.

Treatment: Cattle dipped, 393; hand picked, 125. Horses dipped, 159.

Destruction of small rodent animals: Only the adult spotted fever ticks are directly affected by the dipping process, as they alone attach to the larger domestic animals. In order to reach the immature forms, larvæ and nymphs, the destruction of their small rodent hosts has been urged by the Public Health Service since the beginning of the spotted-fever campaign in 1911. It appears that between these two methods of tick destruction the latter, for several practical reasons, will prove more effective in the Bitter Root Valley.

The methods employed in the destruction of small rodents, principally *Citellus colombianus*, during the present season have been (1) shooting, (2) trapping, (3) poisoning with strychnine. The area over which the rodent animals are being destroyed includes the dipping districts and adjacent territory, approximating 100 square miles in extent. The use of the squirrel destroyer or carbon-bisulphide pump has been abandoned in the valley, first because of the expense in time and labor required for its operation, and also because of its inefficiency probably due to the loose, sandy soil encountered in this region.

Shooting: Sixty thousand .22-caliber rifle cartridges have been utilized in destroying small animals during the present season; of these 35,000 were distributed to landowners and other responsible but unemployed hunters, while the remainder were used by a small force of regular hunters employed in shooting and trapping outside of the cultivated lands. The results obtained from the distribution of small-caliber ammunition show it to have been an extremely economical expenditure.

Trapping: There is less sport to the farmer boy in trapping than in shooting ground squirrels, but 25 No. 1 steel traps will require only a little time and attention while going about the ordinary farm work, and will collect a continuous toll from the squirrels throughout the entire season. The farmers on the west side of the valley have been encouraged to use this method of squirrel destruction.

Poisoning: Of the different measures employed for the destruction of small animals in the tick-infested territory of the Bitter Root Valley properly prepared grain, poisoned with strychnine, has given the best results. It should be understood, however, that complete extermination of the small animals has not been attempted, and probably is not necessary for spotted-fever control. Twenty bushels of hulled oats, or groats, have been distributed during the present season. This was prepared by freshly coating the grain with a mixture of raw starch, strychnine alkaloid, salt, and saccharine. Unhulled grain is not suitable for the destruction of *Citellus colombianus*, because this species of rodent does not pouch its food, but as a rule immediately hulls and eats it.

The best time for poisoning ground squirrels is very early in the spring, as soon as they are out and before the grass is up. This period is very brief, for with the appearance of the green grass the squirrels can not be poisoned profitably. Later on, when the young rodents first appear and the grass and weeds begin to dry, this method of destruction can again be used successfully.

Sheep grazing: It has previously been pointed out that sheep can be used both as tick removers in a purely vehicular capacity, and also as tick destroyers through their deleterious action, directly and indirectly exercised upon the ticks themselves. In order that the full effect of the former method may be secured it is necessary that a large number of sheep be grazed over the same territory in the same direction for successive years. Tick eradication effected in this way by sheep movement has been observed on the east side of the Bitter Root Valley. Further observations made in Elmore County, Idaho, during the present season seem to substantiate the validity of those previously reported from the Bitter Root Valley. In Elmore County it was found that over a strip of country 40 miles wide and 150 miles long, just north of the Snake River, where more than 100,000 sheep have moved north each spring from their winter quarters on the river, no case of spotted fever has occurred during the past 17 years. North of this territory, where the sheep are sheared and begin to range in all directions, the average incidence of spotted fever cases is from 75 to 100 yearly. The only distinctive differences detected between the spotted fever free territory and that adjoining, from which cases have been reported annually, were those of shearing and sheep movement.

On the west-side of the Bitter Root Valley the grazing of outside sheep has been tried, but for economic reasons the slower method of encouraging the west-side farmers, so far as possible, to replace their horses and cattle with small bands of sheep has been found the sounder policy. Many small bands have been started within the past two years, and the results thus far obtained in both tick destruction and in money returns have been good.

Incidence of Rocky Mountain spotted fever: The following table gives the number of cases and deaths of Rocky Mountain spotted fever during 1915:

	Cases.	Deaths.		Cases.	Deaths.
California	2	....	Oregon	46	6
Idaho	362	13	Utah	35	4
Colorado	14	1	Washington	6	....
Montana	34	7	Wyoming	65	9
Nevada	8	3	South Dakota	2	....

The spotted-fever season for 1916 has not yet been completed, but judging from the reports in hand there appears to have been a noticeable reduction in cases for the present year.

Laboratory investigations and publications: The following laboratory investigations were made at the field laboratory at Victor, Mont., and in the Hygienic Laboratory in connection with Rocky Mountain spotted-fever work.

Ten strains of diphtheroid anærobic bacilli were recovered from guinea pigs infected with spotted fever during the year. These bacilli resembled very closely morphologically and culturally two strains recovered from typhus fever guinea pigs at the Hygienic Laboratory and the bacillus typhi exanthematici of Plotz. All were nonpathogenic to guinea pigs.

The apparent infection of guinea pigs when injected with spotted-fever cultures in blood serum kept under lessened oxygen pressures from 21 to 25 days was accomplished.

The demonstration that spotted-fever virus in guinea pig blood serum can be precipitated when greatly diluted and centrifuged for several hours.

The discovery and description of a protozoan organism in spotted-fever guinea pig blood.

In addition to the above a bulletin on the diagnosis and prevention of Rocky Mountain spotted fever was prepared by Asst. Surg. Gen. W. C. Rucker and Surg. L. D. Fricks, and through the cooperation of the respective State boards of health was placed in the hands of the practicing physicians in those districts where the disease prevails.

MEASURES FOR THE SUPPRESSION OF RABIES.

On account of the increasing prevalence of rabies in both domestic and wild animals in California, Nevada, Idaho, Oregon, and other Western States, measures for the suppression of the disease have been inaugurated during the year. A conference called by Dr. George E. Ebright, president of the California State Board of Health, was held at San Francisco December 20, 1915, to consider the advisability of waging an interstate campaign against the infection. Those invited to be present included the governors and representatives of the boards of health of the above-mentioned States, representatives of the United States Forest Service, United States Biological Survey, Bureau of Animal Industry of the United States Department of Agriculture, United States Public Health Service, and representatives of stock growers' organizations of the various States concerned. The meeting was well attended, and sincere interest, enthusiasm, and harmony were manifested. After obtaining authoritative reports of the extent of the disease and its menace to human life and property, a committee, of which Surg. John S. Boggess, of the Public Health Service, was delegated chairman, was appointed in order to correlate the work of the several States. Tentative plans for the institution of the necessary field work were drawn, but further action was prevented by a lack of available funds.

Subsequently, in response to the request of eight States, the Surgeon General of the Public Health Service on January 5, 1916, in conformity with the act of Congress approved July 1, 1902, called an official conference of State health officers and others interested to meet at Salt Lake City, Utah, February 5, 1916, for the purpose of considering the public health aspects of rabies, Rocky Mountain spotted fever, and other matters pertaining to the public health. So far as rabies was concerned, it was resolved "that the United States Public Health Service be requested to detail an officer or officers to cooperate with State health agencies in stimulating and coordinating local activities with respect to the limitation and suppression of this disease." Accordingly Surg. L. D. Fricks, an officer familiar with the topography of the Western States and local conditions predisposing to the spread of rabies among animals, was detailed under date of February 26, 1916, to cooperate with State health agencies and others concerned in the prevention of the interstate spread of the disease, Asst. Surg. Liston Paine being assigned to similar duty under the direction of Dr. Fricks.

From the beginning the rabies situation was considered to be more of an economic than a health problem. The dissemination of the disease among coyotes and sheep dogs had resulted in heavy losses to stock owners from bites inflicted upon cattle, sheep, and other live stock, and there had been every indication of an extensive dissemination of the infection among domestic animals through this means. In spite of this fact but little, if any, increase in the incidence of the disease had occurred in man and human cases remained relatively rare. Potentially, however, a certain amount of danger actually existed, and it was, therefore, deemed advisable to cooperate with the various governmental bodies and other organizations concerned with the eradication of the disease among animals. as well as the respective State boards of health, in efforts to prevent the interstate spread of the infection.

In furtherance of these plans conferences were held from time to time by the officer in charge with representatives of the State boards of health, and advice was given as to the best methods of collecting, shipping, and examining the heads of suspected animals. Inspections of State laboratories were also made upon request and instruction given in the technique of the examination for Negri bodies. Surveys were instituted in several counties of three different States to determine the prevalence of rabies among wild animals and sheep dogs with the idea of deciding as to the necessity and value of a State quarantine against dogs. Inasmuch as a quarantine against dogs would prove valueless in the prevention of the spread of rabies by coyotes and other animals and would inflict great personal losses to sheep owners through inability to properly care for their flocks it was decided that an interstate quarantine against dogs was scarcely warranted, recommendations to this effect being offered. It was further recommended that the prevention of the extension of rabies among dogs in more thickly settled communities and villages could be accomplished by means of publicity obtained through the press and the enactment of ordinances regulating the muzzling of these animals.

The future of the rabies situation, in so far as man is concerned, will necessarily depend somewhat upon the incidence of the disease among animals, but under present conditions with the prophylactic treatment available at the several State laboratories and a widespread recognition on the part of the public of the dangers which may arise from the bites of animals, it is believed that a fair degree of safety is assured. Previous to 1910 rabies was unknown in the Rocky Mountain region; since that date in certain sections it has decimated entire species of wild animals and has automatically exterminated itself by simply exhausting the material on which it thrives. However, this has not been accomplished without untold losses to the residents of those districts through the death of cattle, sheep, dogs, and other domestic animals from the bites of predatory rabid animals. There is every reason to believe that these losses could have been entirely prevented by the adoption of muzzling ordinances in communities originally infected, thus avoiding the dissemination of the infection to virgin territory. A similar situation holds true for Alaska at the present moment. Rabies does not exist among the dog population of the territory, and the establishment of an adequate quarantine would preclude the possibility of its introduction. If quarantine restrictions are not established it is believed that it is only a matter of time before the disease becomes endemic, if not epidemic, thereby bringing about serious losses to the people of that territory.

Sanitary, Educational, and Relief Work in Alaska.

The sanitary and relief work among the natives of Alaska has been continued throughout the year in cooperation with the Bureau of Education, Department of the Interior, as provided for by an act of Congress. In order to be in closer and more direct communication with the officials of the Bureau of Education in charge of the Alaska schools, whose headquarters are at Seattle, the station of the medical officer in charge, Passed Asst. Surg. Emil Krulish, was changed at the beginning of the year from Juneau, Alaska, to Seattle, Wash., thereby facilitating the supervision of the medical service.

The medical officer has been in constant communication with the officials of the Bureau of Education on matters pertaining to hygiene, sanitation, maintenance of hospitals, and the general administration of the medical service in Alaska. The requisitions for medical supplies for hospitals and the 70 schools which are the relief stations of the service were prepared by the medical officer and applicants for the position of physician and nurse were examined and the names of those qualified submitted to the commissioner for appointment. A large number of letters from teachers in the field regarding the treatment and care of the sick were answered. Estimates for the medical service were prepared and submitted to Congress.

The plans for the proposed hospital to be erected at Juneau were drafted by the medical officer, who also selected the furniture, fixtures, and the complete equipment of the institution. The hospital mentioned is completed and is a modern two-story frame structure; one story is devoted to the care of patients and the other is used as living quarters for the staff and attendants. This hospital was opened to receive patients in May and promises to become one of the most important factors in checking the ravages of disease among the native population. Following the completion of the institution the medical officer in charge, upon the request of the Commissioner of Education, proceeded to Juneau and made an inspection of the hospital and assisted in its organization.

The annual reports of the teachers of the Alaska school service indicate that the health of the natives has been exceptionally good and that the sanitary conditions in the villages and homes are improving. The elimination of the common towel and drinking cup from the schools, the medicine chest and medical handbook with which are teachers are supplied, and talks on hygiene and sanitation are responsible in a great measure for these encouraging reports.

The teachers are the only "doctors" and health officers in most of the villages, and their work has greatly promoted the comfort and general welfare of the communities in which schools are located.

The first Territorial Legislature enacted a law authorizing all teachers employed under the Bureau of Education to serve as health officers in their respective native settlements. No epidemics of serious disease have been reported during the year; likewise the morbidity and mortality statistics show a marked decline over previous years.

To those interested in the welfare of the natives of Alaska the work in sanitation and medical relief is very gratifying; the prospects for the uplift and preservation of these people are favorable, provided proper support is received from Congress. Tuberculosis of all forms, eye troubles, and venereal diseases are still very much in evidence, and immediate action is necessary to eliminate them from the various communities. A liberal appropriation for medical relief is required in order to extend the work to other localities; at present only a small portion of the 25,000 natives can be reached by this intensive campaign of disease eradication and the current appropriation of $25,000 is entirely inadequate to the demand.

The supervision over health activities in white settlements is vested in the governor of Alaska as ex officio commissioner of health; four assistant commissioners of health, each in charge of one of the judicial divisions of Alaska; and the local boards of health. The assistant commissioners of health are physicians appointed by the governor and serve without compensation, and the members of local health boards are appointed by the mayor of the town or elected by the people.

The health laws and regulations of the Territory of Alaska are modern in every respect and compare favorably with those of any State, but their execution outside of the modern towns is difficult and at times impracticable on account of the nature of the country, climate, and the more or less floating population.

An unusual number of cases of typhoid have been reported in Juneau, the largest town in Alaska, which, in the opinion of the medical officer, were due to imported cases polluting the water supply of the town. The population of Alaska is increasing annually, and it is to be expected that unless proper precautions are taken infectious diseases will become more prevalent and occur in serious epidemics.

INTERSTATE QUARANTINE REGULATIONS.

Revision of the interstate quarantine regulations, referred to in the annual report for 1915, was completed during the year and the revised regulations were promulgated by the Secretary of the Treasury January 15, 1916, becoming effective from that date. The regulations were promulgated pursuant to the act of Congress approved February 15, 1893, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine Hospital Service," and have for their object the prevention of the introduction of contagious or infectious diseases from one State of Territory into another State or Territory or the District of Columbia and the maintenance of cars, vessels, vehicles, or conveyances operated in interstate traffic in a clean and sanitary condition. All preexisting regulations were revoked from the date of issuance of the revised requirements.

The regulations as promulgated were drafted by the interstate sanitary board, convened under bureau orders of February 2, 1915, and were approved by the annual conference of State and Territorial health authorities with the service, held in Washington May 13 of that year. They have been issued as a service publication.

As an appendix to the Interstate Quarantine Regulations information relating to the use of disinfectants was also published. This comprised data concerning physical, gaseous, and chemical disinfectants, the methods of production, application, and limitations of each, together with descriptive methods of the disinfection of compartments, bedding, cooking utensils, and other material of cars and vessels. Agents for the destruction of vermin, with their mode of application, were similarly described.

Already a noticeable improvement in the sanitation of common carriers has been effected since the issuance of these regulations and in time it is believed that this effect will be even more salutary. It is realized, however, that the mere presence of certain regulations does not guarantee their observance and that additional efforts and administrative facilities will be required before ideal conditions can be brought about. The necessity for an adequate inspection service for the purpose of reporting violations or nonobservance of existing regulations and variations from recognized standards of cleanliness or other derelictions, has long been apparent. Under bureau order of October 4, 1913, and paragraph 138 of the regulations governing the Public Health Service, commissioned medical officers when traveling under official orders on trains and vessels engaged in interstate traffic are required, when practicable, to make observations of the sanitary conditions thereof, forwarding to the bureau immediately upon the completion of the journey a report of the findings. During the year over 200 reports of this character have been received, this information only covering the more important routes of travel in the United States. Many of these reports showed favorable sanitary conditions but a certain proportion described unhygienic and even dangerous surroundings; in these instances the transportation lines concerned were immediately notified of the insanitary features with the request that so far as possible they be corrected. While this system has accomplished considerable toward the bettering of sanitary conditions it naturally has very distinct limitations, one of which is the inability of officers to conduct reinspections. In addition to the aforementioned inspections officers performing various lines of duty, more particularly those engaged in the investigation of water supplies, have similarly studied the sanitary condition of trains and vessels at certain terminal stations. While advantage has been taken of every opportunity to perform inspections on both trains and at terminal stations, the work is recognized as wholly inadequate, especially in view of the total mileage, the number of carriers, and the passengers carried.

In their efforts to bring about improved conditions on cars and vessels common carriers have found the existing regulations of practical value. Heretofore transportation lines under the provision of common law have had the right to refuse for transportation persons suffering from communicable disease, but the exercise of that right was seldom practiced. Now that specific provision has been made prohibiting common carriers from accepting for interstate traffic persons afflicted with certain communicable diseases and permitting the transportation of other infected persons only upon the exercise of proper sanitary precautions, more reasonable and satisfactory rulings will obtain. In the same manner the proscribing of definite sanitary standards for cars, vessels, and vehicles will invite attention to these matters and should result in improved conditions.

WATER AND ICE SUPPLIED BY INTERSTATE CARRIERS.

The enforcement of the various amendments to the interstate quarantine regulations relating to the purity of water and ice furnished by common carriers to passengers on board cars, vehicles, and vessels operated in interstate traffic has continued during the year. The amendments referred to, with the exception of those parts of amendment No. 6 requiring the certification of ice and the cleansing of containers by live steam, were incorporated in and became a part of the existing interstate quarantine regulations as promulgated January 15, 1916.

In 1913, following the issuance of requirements for the bacteriological examination of ice brought into direct contact with water for human consumption, a widespread introduction of separate containers for ice resulted, transportation lines finding it more economical to furnish separate containers than to provide for bacteriological examinations every six months. This was an extremely important outcome, inasmuch as it was realized that clear ice was rarely of danger unless contaminated in handling and that the double-tank system would obviate this difficulty. Moreover, it was believed that specific provision for the safe handling of ice each day of the year was in reality more important than the results obtained from semiannual bacteriological examinations. For these reasons that portion of the regulations bearing on this subject was so modified as to require that the ice used for cooling water shall be clear natural ice, or ice made from distilled water, or water properly certified and further providing that before the ice is placed in the water it shall first be carefully washed with water of known safety, and handled in such a manner as to prevent its becoming contaminated by the organisms of infectious or contagious diseases; the foregoing requirements not to apply to ice which does not come in contact with the water which is to be cooled.

The same system of water certification has been followed as in previous years. Tabulated lists are maintained of all railway and steamship supplies, the certificates as received being checked against these lists. Compliance with the recently promulgated bacteriological standard of purity has been required, and common carriers have been obliged to conform to the standard there set forth, fewer complaints having been received during the fiscal year than at any previous time of inability to meet these requirements. The cooperation of State and municipal health authorities has been essential in the enforcement of water regulations, and the aid and assistance rendered by those bodies has been of inestimable value. Wherever polluted supplies have been discovered their use has been immediately discontinued or provision made for their purification in such a manner as to render them incapable of conveying disease, the latter procedure seldom being required, owing to the elasticity of railway supplies. Water of a suspicious nature is reexamined until its quality is definitely determined.

The following table indicates by States the number of water supplies used by common carriers in each State, the number of water supplies covered by certificates on file, the percentage of water supplies examined, the total number of certificates for these supplies, and the number of polluted sources where the use of the water was forbidden. This table in no way indicates the measure of success of the enforcement of the regulations governing water supplies on interstate carriers, for it must be remembered that the discontinuance of uninvestigated sources of supply, such as wells, brooks, pools, and streams, has been of far greater importance than the relatively few polluted sources determined by examination. Further, the noticeable improvement in the methods of handling water in order to avoid contamination has been of inestimable benefit, although the necessity for more rigid adherence to sanitary principles is still evident.

	Total number of water supplies listed.	Total number of water supplies certified.	Per cent certified.	Total number of certificates received.	Total instances of polluted water.	Total instances ordered discontinued or freed of pollution.
Alabama	99	76	76.7	236	4	4
Arizona	71	56	78.8	106	0	0
Alaska	32	19	59.4	33	0	0
Arkansas	99	79	79.7	169	8	8
California	160	102	63.7	143	2	1
Colorado	87	77	88.5	190	0	0
Connecticut	33	29	87.8	35	1	1
Delaware	14	13	92.8	50	0	0
District of Columbia	14	13	92.8	27	0	0
Florida	120	87	72.5	191	0	0
Georgia	189	141	74.6	417	2	2
Idaho	53	19	35.8	36	2	2
Illinois	171	139	81.2	283	0	0
Indiana	175	146	83.4	316	4	4
Iowa	126	93	73.8	173	12	12
Kansas	149	117	78.5	221	1	1
Kentucky	114	98	85.9	262	2	2
Louisiana	169	137	81.0	260	2	2
Maine	128	113	88.2	361	0	0
Maryland	97	52	53.6	141	0	0
Massachusetts	60	50	83.3	99	0	0
Michigan	149	109	73.1	182	1	1
Minnesota	137	112	81.7	209	20	20
Mississippi	86	75	87.2	110	0	0
Missouri	180	148	82.2	347	2	2
Montana	49	37	75.5	67	3	3
Nebraska	62	56	90.3	158	1	1
Nevada	23	21	91.3	38	0	0
New Hampshire	46	45	97.8	140	0	0
New Jersey	63	58	92.0	210	0	0
New Mexico	25	20	80.0	30	0	0
New York	333	169	50.7	290	2	2
North Carolina	100	84	84.0	242	1	1
North Dakota	44	23	52.2	38	0	0
Ohio	308	284	92.2	659	1	1
Oklahoma	118	85	72.0	127	0	0
Oregon	90	75	83.3	111	0	0
Pennsylvania	285	156	54.7	390	1	1
Rhode Island	15	12	80.0	18	0	0
South Carolina	71	56	78.8	180	0	0
South Dakota	54	33	61.1	51	0	0
Tennessee	92	76	82.6	199	1	1
Texas	330	257	77.8	511	3	3
Utah	25	21	84.0	58	1	1
Vermont	33	31	93.9	72	1	1
Virginia	140	118	84.2	425	1	1
Washington	131	105	80.1	192	3	3
West Virginia	119	56	47.0	107	1	1
Wisconsin	98	66	67.3	82	0	0
Wyoming	34	24	70.5	43	3	3
Foreign:						
Canal Zone	1	1	00.0	1	0	0
Cuba	1	0	0.0	0	0	0
Hawaii	2	2	100.0	2	0	0
Canada	7	6	85.7	16	1	1
Grand total	5,411	4,077	75.3	9,054	87	86

OPERATIONS OF THE SANITARY DISTRICT OF THE GREAT LAKES.

As mentioned in the annual report for 1915, the laboratory of the Sanitary District of the Great Lakes was established at the United States Marine Hospital, Chicago, Ill., on March 1, 1915, with the following personnel: Surg. J. O. Cobb, medical officer in charge; Asst. Surg. C. L. Williams; Sanitary Engineer H. P. Letton; and one attendant. As the work of the laboratory increased an additional attendant was employed. The personnel remained unchanged until December 1, 1915, when Asst. Surg. C. L. Williams was ordered to New Orleans, and Asst. Surg. R. R. Spencer was detailed in his place. The clerical work of the district greatly increasing, an acting clerk was appointed February 17, 1916.

Conditions aboard lake vessels were ascertained to be such as to require immediate attention, and the efforts of the district force were concentrated on this branch of the work during the greater part of the fiscal year. About the 15th of June, 1915, intensive collection of water samples from lake vessels was inaugurated, and this was kept up during the major portion of the operating season. At the same time sanitary surveys were made of nearly every passenger vessel operating on the Great Lakes, as well as a number of freighters. The results of the bacteriological examinations and the sanitary surveys soon showed that it is impossible for Great Lake vessels to obtain a water supply directly from the lake which will, without treatment, at all times conform to the Treasury Department standard. Much attention was given, therefore, to a study of the methods of water purification in current use aboard lake vessels. Representative boats were selected for intensive studies, these investigations demonstrating that the methods adopted were wholly inapplicable for the purpose contemplated. An investigation was then commenced of all methods of water purification capable of adaptation for use on lake vessels. This study was carried on in much detail, and a report describing the conditions aboard vessels, as well as the possible remedies, was published.

On March 10, 1916, a circular letter was addressed to all common carriers obtaining drinking water supplies from the Great Lakes stating that every vessel would be required to install some form of water-purification apparatus which would be automatic in action, proof against carelessness, indifference, or forgetfulness, as well as dependable in every stress of weather. Three methods of treatment were approved, namely, distillation, disinfection by heat from a steam jet, and disinfection by ultra-violet rays. Pursuant to this order many of the carriers have taken steps toward the installation of one of the approved forms of apparatus. Owing to the difficulty of installing apparatus of this character during the operating season, the order as yet has not been strictly enforced, but by the beginning of the coming season every lake vessel deriving its supply from the water over which it is navigated must be provided with proper water-purification equipment.

In addition to the investigations on lake vessels, some attention was paid to steamers operating in interstate traffic on the Illinois River. This river receives all the sewage of the city of Chicago and is turbid a great deal of the time; hence the obtaining of a safe water supply on river vessels requires somewhat different treatment than on lake vessels.

In connection with the inspections of vessels not touching at Chicago it was necessary to ship samples of drinking water used to the laboratory for examination. Inasmuch as such shipments require that the samples be kept at a low temperature, the question of an efficient shipping case arose. All the available data regarding this matter were collected and a shipping case used on the Ohio River investigation was tried out. This case failed to solve the problem, and, after more or less experimentation, a galvanized-iron case insulated with pressed cork was designed. This shipping case will hold eight 4-ounce sample bottles and a sufficient quantity of ice to maintain the water at a temperature below 10° C. for 48 hours. The case is inexpensive and durable. There being considerable question as to the value of the examination of shipped samples, a large number of experiments were performed to determine the viability of bacillus coli under such conditions. This data will be presented in the form of a report at a later date.

Before taking up the study of drinking water supplied passengers aboard trains operating in interstate traffic a comprehensive plan for carrying on the work was prepared. A map covering the entire sanitary district, having a scale of 8 miles to the inch, was obtained, and on this has been shown, by means of colored tacks, the location and status, as far as has been determined, of every source of water supply used by railroads for supplying passengers. From this map a perspective view of the water-supply situation in the entire district can be obtained. Sanitary surveys of watersheds and the collection and examination of samples have already been commenced. Inspections have been made of every railroad terminal in Chicago, special attention being paid to the methods of handling train water. These inspections have indicated that there is a vital necessity for the standardization of methods of handling drinking water for trains.

A number of investigations were made by the laboratory staff in accordance with Bureau orders. On September 17, 1915, Asst. Surg. C. L. Williams reported the findings of an investigation of an epidemic of typhoid fever aboard naval reserve vessels of the Great Lakes, following the maneuvers of that year. Sanitary Engineer H. P. Letton investigated and submitted reports of the sanitary quality of the water supplies at the Vermillion Lake Indian School, the Wahpeton Indian School, and the Holland Pier Head Light Station.

Many conferences have been held with various manufacturers of water-purification apparatus. In several instances where it seemed probable that the equipment would meet the necessary requirements it was temporarily installed at the laboratory and thoroughly tested to determine its availability for use on vessels. A number of transportation companies have sought conferences regarding the installation of water-treatment equipment, and in several instances have submitted specifications of the apparatus which they proposed to install, to determine whether or not it would meet with the Government requirements. Various railway officials have similarly had consultations concerning their water supplies and the methods of handling water on their roads, and a number of letters have also been received from these authorities requesting that sanitary surveys be made of their water supplies.

In conjunction with the above-described activities there is tabulated below in detail the analytical work of the laboratory for the fiscal year.

Water samples examined:	
Total samples from boats engaged in interstate traffic	1,081
Total samples from trains engaged in interstate traffic	324
Total samples from ultra-violet ray apparatus (3 types)	635
Total samples from small porous stone filters	114
Experimental samples—testing longevity of *B. coli* and reliability of ice-packed samples	263
Samples from stills (3 types)	50
Miscellaneous samples	35
Total water samples	2,502

In the analysis of these samples the routine procedure as laid down by the Treasury Department standard and the "Standard Methods of Water Analysis" of the American Public Health Association were closely followed.

Cultures from Indian schools examined for the presence of bacillus diphtheria:		
Positive	26	
Negative	104	
Total		130
Specimens of sputum from Indian schools examined for the presence of tubercle bacilli:		
Positive	9	
Negative	17	
Total		26
Blood specimens from Indian schools for the presence of malarial organisms:		
Positive	0	
Negative	1	
Total		1
Specimens of blood from Indian schools for Widal test:		
Positive	0	
Negative	1	
Total		1
Wassermann tests since December 1, 1915, for United States Marine Hospital:		
Positive	4	
Negative	32	
Total		36
Total miscellaneous tests		194

RECAPITULATION.

Number of water samples tested	2,502
Number of miscellaneous tests	194
Grand total	2,696

OPERATIONS OF THE SANITARY DISTRICT OF PACIFIC.

The interstate sanitary officer of this district made a survey of the extensive watersheds of the company supplying water to the city of San Francisco, at which point many railroad and steamship companies take on water for use of passengers in interstate travel. A survey of a part of the watershed of the company supplying water to the east bay cities was also made, but detailed reports of these investigations have not yet been prepared. A survey of the water supply for the Panama-Pacific International Exposition was made and reported upon during the year.

The interstate sanitary laboratory for this district comprised during the first five months of the year a part of the service exhibit at the Panama-Pacific International Exposition. When the exposition closed the laboratory equipment was removed and installed in part of the Federal laboratory in San Francisco, where the work has since been conducted. On account of the officer in charge having been detailed to other duty in connection with the prevention of the introduction of typhus fever during several months of the present fiscal year, sanitary surveys of the remaining watersheds in the district were not made. Water is taken by common carriers at 124 different places in this district, and during the coming fiscal year a survey of each of these separate sources of supply is contemplated. Letters have been written to each common carrier, and the local address of those responsible for furnishing water at each source has been obtained for use when the local surveys are undertaken.

During the year 29 samples of water were examined and certificates issued when required. All of the samples examined were found to comply with the bacteriological standard promulgated by the Secretary of the Treasury October 21, 1914.

OPERATIONS OF THE SANITARY DISTRICT OF THE NORTH PACIFIC.

By direction of the Surgeon General the work of examining water supplies used by common carriers in the State of Washington was undertaken in November, 1915.

Samples were secured from practically every supply used by common carriers engaged in interstate traffic and the railroads concerned were furnished with certificates conforming to the findings obtained. In addition to this sanitary surveys were made of nearly all the watersheds serving as a source of such supplies.

Upon recommendation of this office the water supplies at the following places were condemned for use by common carriers engaged in interstate traffic, and the railroads concerned were immediately notified by the Surgeon General to discontinue furnishing water from these sources:

Fallbridge, Wash., used by the Spokane, Portland & Seattle Railway.

Cheney, Wash., from springs used by the Northern Pacific Railway.

Republic, Wash., from a well and a creek used by the Great Northern Railway.

In addition to this work numerous typhoid and smallpox vaccinations have been performed as a measure toward the prevention of the interstate spread of these diseases.

OPERATIONS OF THE SANITARY DISTRICT OF THE GULF.

The work of the sanitary district of the Gulf during the past year has been exclusively confined to the examination of the water supplies of vessels leaving the port of New Orleans. Inasmuch as this was the first year of operation of the district it was decided that a survey should be made of water supplies of ships leaving the port, both domestic and foreign, in order to obtain a clear conception of existing conditions. Since the Louisiana State Board of Health through its president, Collaborating Epidemiologist Oscar Dowling, had informed the Public Health Service of its work in examining water supplies on railroad trains entering Louisiana, it was decided that the laboratory of the district should defer its own operations on the railroad phase of the subject pending developments.

The results of analyses of water supplies of vessels entering New Orleans during the year were as follows:

Vessels from which supplies were obtained	186
Total samples collected	397
Number of samples confirmed	211
Number of samples nonconfirmed	186
Number of samples badly polluted	25
Probability of contamination in handling	75
Number of supplies untreated	143
Number of supplies treated	43
Filtered	31
Distilled	6
Other methods	6

In general it may be said that while many of the water samples did not conform to the Treasury Department standard only 6.5 per cent of the supplies showed a high degree of pollution. The supplies were derived from varied sources, water from South American, European, and Central American ports being examined. A great many of the vessels leaving New Orleans take water from the city supply sufficient to last until their return, and the lines plying between New Orleans and New York as a rule take only New Orleans and New York City water. A number of tests of New Orleans city water were made, only a few of which showed colon bacilli present, while in practically all the counts on agar plates were quite low.

Inspections have been made of most of the ships regularly entering the port of New Orleans, and it was found that on the larger vessels the methods of handling the water supply, as well as their other sanitary conditions, were good. On many of the smaller vessels, however, the water for drinking purposes was often found in coolers which were filled by use of buckets from a hand pump leading from the fresh-water tank. The men designated to take care of them were frequently careless and resulting severe contamination in handling was not unusual.

A great deal of time has been spent in adequately equipping the laboratory for the work intended. Several alterations in the laboratory have recently been completed and the installation of a large amount of apparatus has made it possible for the work to be conducted hereafter on an extensive scale.

The sanitary district of the Gulf is well situated for purposes of sanitary control of interstate operations. The progress within its borders of extensive investigations of hookworm disease, malaria, pellagra, and the work in rural sanitation at present being conducted by numerous officers of the Public Health Service place at the disposal of interstate officers a large amount of valuable current information in regard to sanitary and health conditions in all parts of the district.

OPERATIONS OF THE SANITARY DISTRICT OF THE SOUTH ATLANTIC.

The operations of this district, under the supervision of Passed Asst. Surg. J. R. Ridlon, have been mainly confined to bacteriological examinations and sanitary inspections of the Savannah city water supply as furnished to common carriers. During the past fiscal year a total of 175 samples of this water have been examined bacteriologically and numerous inspections of the water systems have been made together with city officials.

The adoption of the standard for water supplies as furnished to interstate carriers has resulted either directly or indirectly in extensive improvements of the water system by the city officials. Plans are in progress for a still more extensive improvement and enlargement of the plant.

In conformity with the interstate quarantine regulations a satisfactory water supply has at all times been furnished to common carriers.

Control of the Interstate Spread of Disease.

In February, 1915, a department circular was issued providing that all Government employees whose duties require them to perform interstate travel or who are engaged in the handling of mail may receive, without cost, vaccination against either smallpox or typhoid fever upon applying in person at one of the designated stations of the Public Health Service. Under the provisions of this circular a large number of Federal employees have been vaccinated during the year. In addition, reports are constantly being received from all marine-hospital stations of admissions of patients suffering from enteric fever, these reports giving in detail the vessel from which the person was removed, the probable source of infection, and other pertinent data. In this manner records are kept of any undue prevalence of typhoid upon interstate carriers. As an example of the value of this plan the following circumstances may be cited:

Reports were received at the bureau from Senior Surg. H. W. Austin in charge of the marine hospital at Detroit, Mich., of admissions to that institution of patients from the Naval Reserve vessel *Don Juan de Austria* suffering from typhoid fever. Passed Asst. Surg. C. L. Williams was accordingly directed to proceed to such places as appeared advisable and to conduct an investigation into the circumstances of the outbreak. Information obtained from various sources showed that the vessel has been manned by a crew of approximately 180 men from the Naval Reserve, and had proceeded on a practice cruise to various points on Lake Erie. During the cruise there developed on board the *Austria* numerous cases of diarrhea, it being stated that as many as four-fifths of those on board were affected, and thereafter 15 cases were diagnosed as typhoid fever, with a number of other cases in which this diagnosis was probable. While it was the impression of the investigating officer that the general sanitary conditions on board the vessel were lax the evidence seemed to indicate that the most probable source of infection was the water taken on board through a leaky condenser while in Erie Harbor. This constituted a distinct violation of the Interstate Quarantine Regulations and the epidemic strikingly illustrates the necessity for rigid adherence to the requirements therein promulgated.

The steadily increasing difficulties in dealing with the leprosy problem have been a matter of concern for a number of years. The problem at present is almost wholly interstate in character, and it is constantly assuming larger proportions, without adequate means existing for its solution. That this disease constitutes a serious menace to the country is beyond question, and it would seem that even health authorities themselves had belittled, or at least failed to recognize, its importance. Only two or three States or municipalities have made proper provision for the segregation and care of lepers, and it appears improbable that others will take such action. Urgent requests are constantly being received from State and city boards of health for assistance in handling these cases and failure to supply means for surveillance or isolation inevitably results in hardships to the patient and often endangers the health of the community. The necessity for the establishment of a Federal leprosarium has never been more apparent than during the past year, and it is to be sincerely hoped that the consummation of this plan is not far distant.

In general it may be stated that the prevention of the interstate spread of disease is becoming a steadily increasing important function. Already the work of the service in this field includes such diseases as plague, rabies, Rocky Mountain spotted fever, poliomyelitis, typhus, typhoid, smallpox, and other conditions as they arise.

FOOD POISONING AT WESTERLY, R. I.

During July 1915, an explosive outbreak of a disease, characterized by severe gastro-intestinal symptoms, thirst and profound prostration, occurred at Westerly, R. I. As many as 60 persons were affected, of whom 4 died. Owing to the marked resemblance of the symptoms to those of cholera an officer was detailed to conduct an investigation, Surg. C. H. Lavinder being assigned to that duty. Upon inquiry it was found that all of the persons affected had eaten pie obtained from a certain restaurant and that no other food or drink had been partaken of in common by the various victims. The members of the respective families who had not eaten this particular article of diet remained free from all symptoms. From these facts the conclusion seemed warranted that the symptoms resulted from either chemical or bacteriological contamination of the food. Later investigation by the Rhode Island State Board of Health demonstrated that the outbreak was due to infection of the food with *Bacillus paratyphosus* B.

Sanitary Inspection of Government Buildings.

Conformatory to Executive Order No. 1498 of March 15, 1912, inspections of the sanitary and hygienic condition of Government buildings located in the District of Columbia, excepting those of the War and Navy Departments, have continued during the year, all of the buildings comprehended in the order being inspected by Passed Asst. Surgs. J. R. Hurley and R. A. Kearny.

The resultant benefit of inspections consistently carried on over a period of years is now plainly evident, many improvements having been instituted tending to enhance the hygienic and sanitary environment of Government employees. Custodians have invariably afforded every cooperation possible and manifested a desire to correct, within the limits of available appropriations, whatever defects were indicated.

Judging from the reports of the inspections made of the buildings within the District of Columbia, it can be safely asserted that the extension of these inspections to Government buildings elsewhere would be productive of much good.

The following matters are given attention at the time of inspection: Ventilation, lighting, heating, overcrowding and congestion, drinking-water supply, toilets and lavatories, cleaning methods and cleanliness, and other conditions tending to affect the welfare of employees.

Ventilation.—In buildings having modern mechanical systems of ventilation this question is satisfactorily solved. In others recommendations are made looking toward the free utilization in every manner of natural sources of air, as for example the installation of windshields which permit of efficient ventilation in the cooler months without accompanying drafts, the opening of windows for five-minute periods at intervals during the day, a custom now well established in Government buildings, and the use of electric fans as an aid in ventilation and cooling during warm weather.

Lighting.—While in the majority of buildings where artificial light is needed in the daytime, the electrical installation is sufficient to illuminate the rooms, the lighting units are often not found so arranged, or of a type suitable to properly illuminate the work carried on. Wherever found, defects of this character are pointed out and suitable recommendations made for their correction. The installation of indirect or semi-indirect systems of lighting in Government buildings would go far to remedy conditions of eyestrain, with consequent impaired efficiency, which result from glare and shadows caused by present improper installations. The effective, diffuse, and restful light produced by indirect lighting would more than compensate for the questionable slight increase of cost in maintaining such systems.

Heating.—The majority of Government buildings are heated by steam, although in a number hot-water and hot-air systems are in use. It is very seldom that an insufficiency of heat is found, the prevailing defect being a relative low humidity in the atmosphere with overheating. An economic waste of fuel results from this condition as, with a low humidity, a much higher temperature is needed for comfort than where the wet and dry bulb readings more nearly approximate each other, the temperature being from 65° to 70° Fahrenheit. Save in those buildings where mechanical ventilating systems exist, whereby the air is humidified previous to distribution, this defect is difficult of correction.

Overcrowding.—Overcrowding, with its attendant evils, such as the rapid spread of colds and other communicable diseases, is a condition not uncommonly encountered, being in part commensurate with governmental growth and expansion. This expansion and readjustment of departments, bureaus, and divisions has been at a rapid rate in recent years, consequent upon additional duties imposed through congressional enactments, the personnel increasing at a more rapid rate than the space available for its use. Every effort has therefore been necessary to prevent overcrowding.

The congestion of floor and air space with cumbersome cabinets and filing cases which aggravate overcrowding has been largely done away with in recent years, consequent to recommendations made by the inspecting officers. This was accomplished by relegating those pieces of furniture to files, rooms or basements, and in many instances by their complete removal, substituting therefor smaller pieces of more modern design.

Drinking-water supplies.—Chilled water is furnished in all buildings for drinking purposes, numerous devices being in use for cooling and storing. All these devices, whether bottle, double-jacketed cooler or bubbling fountain, aim to provide water cooled to taste without permitting contamination. This is accomplished by preventing the ice from coming into direct contact with the water it is meant to cool. The employees are furnished with individual drinking glasses in all buildings, and regulations have been made prohibiting leaving these at the cooler for common use.

Toilets and lavatories.—In most instances as regards plumbing, ventilation, and general cleanliness, these rooms are found to be in a highly satisfactory condition. In certain cases the facilities provided are inadequate for the number of people obliged to use them. Liquid soap and paper towels are generally provided.

Cleaning and cleanliness.—Great improvement both in the methods used and in the consequent results have been effected as regards cleaning and cleanliness throughout all Government buildings. Vacuum cleaners and floor-scrubbing machines have been installed; easily splintered, soft pine floors with large cracks between the boards have given place to hard wood floors; carpets have been replaced by easily cleaned linoleum; dry sweeping and dusting have been suppressed and oiled rags and oiled sawdust have replaced the feather duster and the dry straw broom. The adoption of these and other improvements have been of great benefit in solving Government house-cleaning problems.

Welfare of employees.—Cafeterias, where the employees may secure hot lunches for a nominal sum, and women's rest rooms have been fitted up in quite a number of the Government buildings, tending materially to enhance the welfare of the employees. Sanitary, metal clothes lockers have been installed, and there has been a material reduction of insanitary practices brought about by the introduction of sanitary cuspidors and other means.

NATIONAL SAFETY-FIRST EXHIBIT.

Participation in the National safety-first exhibit, organized under the auspices of various Government bureaus for the purpose of demonstrating what the National Government is doing toward protecting and saving human life, was obtained by the Public Health

Service through an exhibit prepared under the direction of Surg. E. A. Sweet.

The exhibit material was composed of the following:

The center of the exhibit group was occupied by an emblematic figure of man, on either side of which were terse statements of achievements in the eradication of disease accomplished during the last decade. The manufacture of typhoid vaccine was demonstrated, each successive step in the process being succinctly labeled. Models of rat-proof houses showing the various methods of rat proofing, a model of a vermin-proof stable, and also a model showing the construction of a rat-proof wharf, were exhibited. A properly muzzled dog was placed in the center of the exhibit in order to bring to the attention of the public not only the loss of life from a preventable disease, rabies, but also the economic loss which results from this infection. The remainder of the exhibit material was composed of photographs illustrating quarantine procedure, and placards showing the reduction in mortality of such conditions as "Fourth of July" tetanus, smallpox, typhoid fever, and diphtheria. Illustrated lectures were also given in the auditorium by Service officers upon matters relating to health.

GOVERNMENT SAFETY-FIRST TRAIN.

The Government safety-first train, an outgrowth of the safety-first exhibit held in Washington, was organized and equipped by various Governmental departments to demonstrate the activities of the National Government in the conservation of human life. The Treasury Department was represented by the Coast Guard and the Public Health Service, the exhibit of the latter being prepared and installed under the direction of Asst. Surg. Gen. W. C. Rucker.

As originally planned the itinerary included stops on the lines of the Baltimore & Ohio Railroad at stations in the States of Pennsylvania, Maryland, West Virginia, Missouri, Illinois, and Ohio, the circuit to be begun at Washington, D. C., on May 1 and to be completed in the same city on June 30. The success of the train and the interest manifested were so pronounced, however, that in June the itinerary was extended to include certain stations in the States of Kansas and Oklahoma on the lines of the Missouri, Kansas & Texas Railway, and in Wyoming and Nebraska on the lines of the Union Pacific, the modified itinerary to be completed at Washington, D. C., on August 31, 1916.

The train consisted of nine exhibit cars, with three additional coaches for those in charge, one car being devoted entirely to the exhibit of the Public Health Service. In the equipping of this car every effort was made to demonstrate certain of the more elementary principles of sanitation in such a manner that the public could readily and almost instantly grasp and appreciate the lessons taught. This appeared essential to the success of the exhibit, inasmuch as space was limited and lengthened observation was to be avoided on account of the consequent delay. For this reason all placards were made extremely brief and the several models displayed in such a manner as to tell their story at a glance.

The evils attending careless garbage disposal with resultant rodent infestation of the home, were shown by a large sectional model. Supplementing this exhibit were models demonstrating the construction of rat-proof houses and stables, each model illustrating the various methods of rat proofing by the use of cement, metal flashing, brick walls, and the proper screening of openings. The pollution of wells from insanitary toilets was also demonstrated, a second model showing the improper and the proper construction of wells. Greatly enlarged models of the eggs, larva, and adult house fly were exhibited, together with similar models of the various stages of development of the Anopheles mosquito. With this latter group there were shown methods for the elimination of mosquito breeding places by filling, draining, oiling, and the stocking of pools with fish. A model of a sanitary contrasted with an insanitary dairy was an interesting feature of the exhibit, not only to milk producers but to milk consumers also. The most approved methods for the disposal of human excrement were demonstrated by models of sanitary toilets and sewage-disposal tanks, and in addition other models brought to the attention lessons in personal and community hygiene, such as the prevention of smallpox, the dangers of careless coughing, and the use of the common roller towel. A display of public health literature published by the service proved to be a most valuable part of the exhibit, resulting in many thousands of requests for pamphlets and reprints, and greatly augmenting its instructive features. Motion pictures and stereopticon lantern slides on health subjects were also provided and shown when opportunity developed.

The attendance exceeded all expectations. The total number of visitors for the two months ending June 30th was more than 348,000, a daily average of 6,500. In addition many thousands who could not be accommodated were turned away. The motion picture audiences varied, the average being about 2,000, but frequently the gatherings were composed of from 3,000 to 4,000 persons.

At the inception of the idea of a Government safety-first train the director thereof requested that an officer of the service be detailed to act as sanitary and medical officer. Accordingly, Senior Surg. Charles E. Banks was directed to assume this duty. A daily inspection of the entire equipment was made, including Pullman and dining cars, and all insanitary features noted were remedied. Pullman cars were in several instances disinfected with formaldehyde and special attention was given to cleanliness and order. The health of the men was looked after to the fullest possible extent, both the members of the crew and those in charge of the Government exhibits receiving the typhoid prophylactic. Water, milk, and other food supplies were regulated and careful inquiry made in advance concerning the healthfulness of the different communities, the occurrence of epidemics of smallpox necessitating the abandonment of stops at two different localities. Before the contemplated itinerary was completed Senior Surg. Banks was relieved by Asst. Surg. Liston Paine, who, with two attendants previously detailed to care for service exhibits, were continued on duty until the end of the fiscal year.

SANITARY WORK AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

The work of sanitation at the Panama-Pacific International Exposition, outlined in the annual report for 1915, was continued during the year under the supervision of Senior Surg. C. C. Pierce.

Although a large number of horses, cattle, and other animals were kept in the live-stock section, fly breeding was obviated by proper collection and disposal of stable manure and general cleanliness, particular care also being exercised in the collection and disposal of garbage in all parts of the exposition grounds. Places where food was prepared and sold were screened to prevent access of flies from outside sources. Close attention to the numerous fountains and other artificial collections of water prevented mosquito breeding.

During the latter months of the exposition rat evidence was observed in many of the buildings, necessitating poisoning and trapping operations. After the close of the exposition and during the demolition of the buildings extensive rat eradicative operations were conducted, a record of this work being found in the report dealing with service activities at San Francisco. All rodents obtained were examined for plague infection at the Federal laboratory, none being found infected.

The inspection of employees of the various commissions and of the exposition company was continued, no communicable diseases being discovered during the year. A number of cases of diphtheria occurred among guests at one of the hotels. The patients were sent to the San Francisco Isolation Hospital and proper precautions taken to prevent secondary cases, none of which developed.

The customary control of the water supply and purification plant was continued by means of bacteriological examinations, both before and after chlorination, showing that the purifying process was effective.

Sanitary inspections of over 150 concessions were made each month, the reinspections totaling over 1,200 monthly. The insanitary conditions corrected under orders from the inspectors averaged 150 each month.

THE SERVICE EXHIBIT AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

A description of the service exhibit at the Panama-Pacific International Exposition was included in the annual report for 1915. Some few additions were made to the exhibit material during the fiscal year. A total of several hundred thousand persons visited the exhibit, the usual number of officers having been present to explain its various phases and to demonstrate working processes.

Upon the termination of the exposition a portion of the material was sent to Panama to be installed under the direction of the chief quarantine officer as a service exhibit at the international exposition held by the Panama Government. The remainder, constituting the greater part of the material, was shipped to the Panama-California Exposition at San Diego, to remain during the calendar year 1916.

THE EMERGENCY HOSPITAL, PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

The operations of the emergency hospital at the Panama-Pacific International Exposition were continued during the year. This hospital was established and operated on the exposition grounds in order that first aid might be effectively provided without undue delay and as a necessary adjunct to the proper sanitation of the fair, the prompt recognition and isolation of cases of infectious disease being an important consideration in disease prevention. The institution as organized was strictly an emergency hospital under the control and management of the Public Health Service, but with the expenses of maintenance paid for by the exposition authorities. The equipment was complete in every respect and was installed as a working exhibit of the service.

From the beginning of the fiscal year until the close of the exposition, December 4, 1915, 4,025 patients were treated or cared for, this number not including those who were re-treated or patients receiving their second or third injection of typhoid prophylactic. From the date of establishment of the hospital until the close of the exposition 14,337 treatments were recorded, the greater number of these cases during the preexposition period being accidents and injuries, while during the time the exposition was open the usual emergency medical and surgical cases were most numerous. An adequate ambulance service was maintained and accurate records were preserved of all cases treated.

After the close of the exposition the Public Health Service retained control of the hospital during the period of demolition, at the request of the exposition authorities. The operating force was reduced to the regular employees, the medical officer visiting the institution from time to time as necessity required. During this period the hospital became practically an out-patient clinic, patients requiring hospital treatment being immedately transferred to various hospitals in San Francisco. The total number of patients treated during the postexposition period was 1,240, most of whom were workmen injured while engaged in the removal of exhibits or the demolition of buildings.

STEREOPTICON LOAN LIBRARY.

As mentioned in the annual report for 1915 the facilities of the stereopticon loan library, originally established for service officers, were extended to scientific investigators, health departments, and social workers throughout the country. The number of lantern slides has steadily increased, over 3,000 views being on file, with a total of approximately 12,000 slides. The usefulness of the loan library has been commensurate with its growth and extension. Slides are forwarded to lecturers in every portion of the country, used before public gatherings or scientific bodies, returned to the library, and again placed in circulation. During the fiscal year 372 loans of this character were made, requests in many instances being denied on account of lack of material. Occasionally the slides are retained for several weeks, and in the case of service officers for several months, being shown to many different audiences. The number of slides in circulation at the end of the fiscal year exceeded 5,000, and the total number loaned during the year was 21,480. If the average audience consisted of 200 persons, and each set of pictures was shown twice, figures which are the very minimum, over 148,000 persons profited from these visual lessons in sanitation.

During the year two additional motion-picture films were acquired, and the limited number of reels on hand have been in constant use.

Requests for good motion-picture films on health subjects are being constantly received, the public interest in motion pictures being at its height, and a far larger supply of films is urgently needed, particularly by service officers engaged in field work. Only 6 films are in possession of the bureau, and the total number of reels is less than 10. When it is considered that motion pictures constitute one of the best methods of teaching the lessons of sanitation and disease prevention, the inadequacy of this supply becomes all the more apparent.

EDUCATIONAL WORK.

Lectures by service officers on health topics have been given in connection with the field work in various sections of the country, and on different occasions upon request. Public-health lectures of this character are highly important adjuncts to the effective performance of the duties of the service, besides being of assistance to other health organizations, in their campaigns for reform. Audiences in poliomyelitis centers have been instructed in each of several foreign languages as to the measures to be adopted for the suppression of the disease. The Spanish-speaking population along the Mexican border have had the story of the transmission of typhus explained to them in terms which they could easily comprehend, while scientific organizations have heard discussions on the technical phases of many public-health problems. It is to be regretted that requests for addresses by officers can not be complied with in every instance, owing to the limited number of men available for this duty.

The press service has been continued throughout the year with a steadily increasing number of newspapers, magazines, and even of medical journals using the material on health topics furnished. During the last month of the fiscal year 702 newspapers voluntarily forwarded clippings showing the use of Health News items on 1,205 occasions, and many times that number have utilized material of this character, of which no record has been made. Extensive circulation has been given by the press of the country to articles on such subjects as the following: "The prevention of pneumonia," "How the Government is meeting the malaria problem," "Housing and health," "Pellagra prevention," "Give the baby a chance," and other topics. In addition, information has at all times been freely furnished the press for special articles relating to health or disease prevention.

SANITARY REPORTS AND STATISTICS.

The work of the division of sanitary reports and statistics consists principally of (1) the collection of information of the prevalence and geographic distribution of preventable diseases throughout the United States and of certain major epidemic diseases throughout the world; (2) the collection of laws and regulations adopted by States and cities on matters pertaining to the public health; and (3) the publication (a) of current information regarding the prevalence of diseases, (b) of laws being enacted and court decisions rendered on matters pertaining to the public health, and (c) of other information useful to the health officer in his work. The medium of publication is the Public Health Reports, which are issued weekly and sent to health officers and others engaged in sanitary work.

Registration Area of Known Disease Prevalence.

The fourteenth annual conference of State and Territorial Health Authorities with the United States Public Health Service, held in Washington, May 13 and 15, 1916, adopted the following resolution:

> *Resolved*, That this conference believes it is now feasible to create a "registration area of known disease prevalence," and recommends that the Surgeon General inquire into its practicability from the standpoint of the Public Health Service and determine the standard for admission of States and cities thereto.

The establishment of such an area would be a decidedly progressive step. It would mark the turning point in public health administration. It would be an incentive to intelligent, effective work in the control of disease, inasmuch as it would make available that first essential of such control, a knowledge of where preventable diseases were and the conditions under which cases were occurring. Such a registration area could be established and supervised and the morbidity data compiled simply by the addition of a few clerks to the present personnel of the division.

Collaborating Epidemiologists.

Collaborating epidemiologists have been appointed in the following States: Maryland, Massachusetts, South Carolina, Arkansas, Louisiana, Virginia, Minnesota, Kansas, Washington, Mississippi, and Connecticut. These officers are appointed one to a State, and their duties are to keep the bureau currently informed of the occurrence of preventable diseases in their respective jurisdictions.

In Kansas the collaborating epidemiologist distributes monthly to the practicing physicians of the State reply post cards on which they report the number of cases of notifiable diseases treated by them during the preceding month. These serve as a useful check upon the cases reported in the usual way to the board of health and have increased the accuracy of the information available regarding the prevalence of disease. The collaborating epidemiologist has also distributed to registrars blanks on which they report weekly the names and addresses of the mothers of babies whose births have been registered. Upon receipt of these reports, supplement No. 10 to the Public Health Reports, "The care of the baby," is sent to each mother.

The collaborating epidemiologists in Minnesota, Massachusetts, Maryland, and Kansas keep the bureau informed currently by telegraph of the occurrence of outbreaks of communicable diseases in their respective jurisdictions. In the other States current information of the occurrence of outbreaks of these diseases is not as yet available.

PREVALENCE OF DISEASE IN THE UNITED STATES.

Efficient work on the part of a health department depends primarily upon a knowledge of the prevalence and location of cases of those diseases which it is the aim of the health department to control. This information of disease occurrence is essential to the work not only of the local health departments, but also of State health departments and the Federal health service. No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

Pursuant to the specific responsibilities imposed by Congress in the act approved February 15, 1893, every effort has been made to keep currently informed of the prevalence and geographic distribution of the preventable diseases throughout the United States. Not only has advantage been taken of existing sources of information and the records available in health departments of States, cities, counties, and townships, but, in accordance with the established policy of the department, an attempt has been made to increase the available information through the education of health officers and practicing physicians as to its importance. Health departments are rapidly coming to realize that it is necessary that they have exact and current information of the prevalence of diseases if their efforts at control are to be at all effective. As a result the extent of the territory in which records of the current prevalence of disease are available is rapidly increasing. It is becoming generally recognized as a truth that efficient health administration and accurate information of the prevalence of disease go hand in hand, and are inseparable.

The available data relating to the prevalence of disease has been currently published in the Public Health Reports for the information of health officials throughout the country.

During the latter part of the year poliomyelitis, or infantile paralysis, became epidemic in New York City and adjacent territory. Because of the great dread in which the disease is generally held and also that all possible measures might be taken to prevent its spread, it was especially important that the occurrence of cases should be promptly known. Officers of the Public Health Service and health officers throughout the country have kept the bureau informed by telegraph of the occurrence of cases. The information thus obtained made it possible to watch the gradual extension of the disease and gave the confidence and assurance that accompanies definite information.

ANTHRAX.

A special inquiry was made to ascertain the recorded prevalence of anthrax in the United States. A letter was sent to each State health officer asking for a statement of the number of cases recorded in his State and the number of deaths registered as due to anthrax. The results are shown in the accompanying table, only those States being included which reported either recorded cases or deaths.

Additional information regarding the source of infection was given as follows:

California.—During 1915 one case was said to have been contracted in handling hides shipped from China; one case in handling the carcass of an animal; one case by scratching a toe while swimming in an irrigation ditch; one was an infection in the ankle, but it was not known how it was contracted. The three cases in 1916 were all contracted in the skinning of animals.

Indiana.—Anthrax is not a notifiable disease in Indiana.

Kansas.—During 1915 one case of anthrax was reported; in 1916 to September 1, three cases. Of the 1916 cases the source of infection of one was given as due to handling hides. Probable source of infection in the other two cases was not known.

Louisiana.—Of the four cases in 1915, one was said to have been contracted from an infected cow; two in skinning carcasses of animals; one occurred in an employee in a blacksmith shop.

Maryland.—The case reported in 1915 was said to have been contracted in skinning the carcass of a cow.

Minnesota.—The one case reported in 1915 was said to have been of doubtful diagnosis. No post-mortem examination was made. The condition resulted from what was supposed to have been the bite of a flea. There was no previous history of anthrax in the neighborhood.

Utah.—Of the two cases reported in 1915, one was said to have been caused by the bite of a flea, the other to have been caused by handling infected animals.

State.	1915		1916 to Sept. 1.	
	Cases.	Deaths.	Cases.	Deaths.
California	5	2	3	1
Indiana		2		1
Iowa		1		
Kansas	1		3	
Louisiana	4	2	3	
Maryland	1			
Michigan			1	1
Massachusetts	11	3	25	4
Minnesota	1	1		
New Hampshire			2	
New Jersey	4	2	3	
New York	14	13	11	2
North Carolina				2
Ohio	2	2	1	
Utah	2			
Texas			8	2

DENGUE.

An outbreak of dengue was reported in Laredo, Tex., November, 1915.

In Hawaii 21 cases were reported during 1915. In Porto Rico there were 13 reported cases, 4 in September, 5 in October, 1 in November, and 3 in December.

DIPHTHERIA.

Diphtheria is present throughout the country. Cases are found practically in every community of any size at some time during the year. It attacks children more frequently than adults. Usually, therefore, more cases are likely to occur in populations having many children, and, conversely, few cases may naturally be expected in communities with few children.

Before the days of the bacteriological diagnosis of the disease only those cases were recognized as diphtheria which were characterized by a well-developed membrane in the throat or nose. These included the more severe cases. With bacteriological diagnosis made easier, especially in the large communities, many cases which formerly would not have been recognized are now known to be diphtheria. These include many of the clinically milder cases, without typical membranes or with no membrane at all. With the aid of bacteriological diagnosis a larger percentage of the cases of diphtheria is being recognized and recorded, but there are undoubtedly many mild cases which are still unrecognized as being diphtheria. This recognition of the mild as well as the severe cases should have the effect of giving a lower indicated fatality rate, and this has been the effect wherever satisfactory records of the prevalence of the disease have been secured.

In the comparison of records of diphtheria in different communities difficulty is met because of the varying completeness with which cases of the disease are reported. The differences found in making comparison are as likely to be due to differences in the completeness of the records as they are to differences in the prevalence of the disease. This condition would be changed under uniform requirements for notification of diease and uniform practice as to the enforcement of these requirements.

Of the States having health departments which attempted to secure information of the prevalence of disease within their jurisdictions for the calendar year 1915, the highest reported case rate for diphtheria was that for New Jersey, with a rate of 2.41 per 1,000 inhabitants. The next highest rates were in Virginia and New York, with rates of 2.39 and 2.06, respectively. The lowest reported rates were in Nevada, Louisiana, and Wyoming, with 0.01, 0.08, and 0.11, respectively.

Of the cities of over 100,000 population, the highest reported case rates were in New Orleans, St. Louis, and Boston, with 5, 4.84, and 3.91, respectively, per 1,000 population. The lowest reported case rates were in Seattle, Louisville, and Denver, with 0.21, 0.72, and 0.91, respectively.

For the year 1915 the highest indicated fatality rates were in Nevada, Alabama, and Arizona, with rates of 100, 34.58, and 31.19, respectively, per 100 reported cases. The fact that Nevada reported a very low case rate and a 100 per cent fatality rate indicates that reporting of cases was very incomplete. The lowest fatality rates reported were in the District of Columbia, South Carolina, and West Virginia, with 4.35, 4.67, and 4.94, respectively, per 100 cases reported.

The highest fatality rates recorded in the larger cities were in Fall River, New Bedford, and Albany, with indicated rates of 20, 17.33, and 14.29, respectively, per 100 cases reported. The lowest rates were in Richmond, Denver, and Seattle, with 1.92, 2.62, and 2.86, respectively.

Diphtheria—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	590	204	0.256	[2] 34.58				
Arizona	247,299	109	34	.441	[2] 31.19	41	24	0.172	[2] 58.53
California	2,848,275	3,660	311	1.285	8.50	2,679	268	.971	10.00
Connecticut	1,223,583	2,161	193	1.766	8.93	2,662	228	2.213	8.56
District of Columbia	358,679	644	28	1.795	4.35	452	31	1.279	6.86
Hawaii	231,210	133	32	.575	[2] 24.06	365	29	1.754	7.95
Illinois	6,069,519					10,458	1,088	1.747	10.40
Indiana	2,798,142	[3] 2,946	297	1.053	10.08	3,329	375	1.198	11.26
Iowa	2,221,038					1,030	159	.464	15.44
Kansas	1,807,221	2,564	245	1.419	9.56	1,528	170	.856	11.13
Louisiana	1,801,306	152	(5)	.084		1,794	114	1.012	6.35
Maryland [4]	1,351,941	2,541	(5)	1.880		790	89	.589	11.26
Michigan	3,015,442	2,249	338	1.409	7.95	4,921	476	1.654	9.67
Minnesota	2,246,761	2,647	190	1.178	7.18	4,577	347	2.067	7.58
Mississippi	1,926,778	1,092	(5)	.567		1,089	195	.573	17.91
Montana	446,054					263	28	.608	10.65
Nevada	102,730	1	1	.010	[2] 100.00				
New Jersey	2,881,840	6,941	501	2.409	7.22	7,378	611	2.620	8.28
New York	10,086,568	20,806	1,754	2.063	8.43	22,537	2,006	2.277	8.90
Ohio	5,088,627	8,962	(5)	1.761		9,621	(5)	1.914	
Oklahoma	2,114,307	2,298	193	1.087	8.40				
Oregon	809,490	373	25	.461	6.70	322	28	.425	8.70
Philippine Islands	8,650,937					41	241		
Porto Rico	[6] 1,184,489	186	30	.157	16.13	131	41	.111	31.30
Rhode Island	602,765					990	106	1.675	10.71
South Carolina	1,607,745	1,947	91	1.211	4.67	2,088	(5)	1.313	
South Dakota	680,046					197	16	.298	8.12
Texas	4,343,710	2,433	436	.560	17.92				
Utah	424,300	477	47	1.124	9.85	338	39	.816	11.54
Vermont	362,452	557	37	1.537	6.64	442	40	1.224	9.05
Virginia	2,171,014	5,195	(5)	2.393		2,724	274	1.267	10.06
Washington	1,471,043	406	37	.276	9.11	459	44	.326	9.59
West Virginia	1,359,474	688	34	.506	4.94				
Wisconsin	2,473,533	1,699	186	.687	10.95	2,287	286	.945	12.51
Wyoming	174,148	20	6	.109	30.00	50	8	.306	16.00

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[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] A fatality rate as high as this indicates that the cases have not been completely reported.
[3] The health officer states that cases are known not to be completely reported.
[4] Maryland figures for 1914 are exclusive of Baltimore city.
[5] Deaths were not reported.
[6] Estimated as of July 1, 1914.

FOOT-AND-MOUTH DISEASE.

A case of foot-and-mouth disease in man was notified at Ellsworth, Kans., November, 1915, and a case at Salina, Kans., in December.

INFLUENZA.

In November and December, 1915, a disease resembling influenza was reported epidemic in practically all parts of the United States. Outbreaks of this disease extended from the Atlantic seaboard to the Pacific coast and penetrated even to such localities as central New Mexico. The disease spread throughout the country with great rapidity. In San Francisco, one of the first localities in which the disease was reported, the outbreak was said to have been the most severe of any since 1891, and the bacillus of influenza was reported to have been isolated. In many localities "grip" was reported epidemic, in others pulmonary infections were said to be unusually prevalent. The increase in the number of deaths registered as due to pneumonia was an index of the prevalence of the disease. At the height of the epidemic in some localities the morbidity rate was so great that difficulty was experienced in many establishments in carrying on ordinary business, due to the illness of a large percentage of the personnel. In December it was estimated that there were 100,000 cases of griplike disease in the city of Detroit. The hospitals were crowded.

In many places the schools were partially depopulated because of the number of pupils at home sick.

The New York City Department of Health, where griplike infections were prevalent, made a bacteriological study of 50 cases diagnosed as grip. The streptococcus was found in 26 cases, the diplococcus lanceolatus in 19, the micrococcus catarrhalis in 18, and the bacillus of influenza in 9. Other organisms commonly present in sputum and nasal discharges were also found. As an interesting comparison a somewhat similar study made in New York City during a previous year showed the influenza bacillus present in only one specimen out of 20 examined. The presence of the influenza bacillus in 9 of the 50 cases examined suggests that influenza was a distinct factor in the outbreak in New York. The findings in the other cases suggest that other infections due to the streptococcus and to the micrococcus catarrhalis were probably as great factors, also that the pneumococcus undoubtedly played a part and frequently complicated the other infections.

The increase in the number of deaths registered as due to pneumonia during the period in which the griplike infection was prevalent is illustrated by the following table, giving by weeks the numbers of deaths registered as due to pneumonia in certain cities:

Deaths ascribed to pneumonia.

	Week ended—										
	Oct. 23.	Oct. 30.	Nov. 6.	Nov. 13.	Nov. 20.	Nov. 27.	Dec. 4.	Dec. 11.	Dec. 18.	Dec. 25.	Jan. 1.
Baltimore, Md	8	4	6	11	18	15	20	15	15	20	26
Birmingham, Ala	......	......	......	......	......	......	2	5	5	8	11
Boston, Mass	12	17	16	11	13	20	24	33	27	27	45
Bridgeport, Conn	4	2	4	6	......	3	3	3	5	11	18

Deaths ascribed to pneumonia—Continued.

	Week ended—										
	Oct. 23.	Oct. 30.	Nov. 6.	Nov. 13.	Nov. 20.	Nov. 27.	Dec. 4.	Dec. 11.	Dec. 18.	Dec. 25.	Jan. 1.
Buffalo, N. Y	9		4	11			8	9	10	11	22
Cambridge, Mass	3	3	3	3	5	2	4	6	5	1	12
Charleston, S. C	1	1	1		2	2		2	7	1	5
Chicago, Ill	47	37	38	51	37	66	75	77	108		302
Cincinnati, Ohio	4	3	6	7	8	8	5	8	10	12	12
Cleveland, Ohio	13	11	15	16	20	21	15	13	21	33	39
Columbus, Ohio	1	1	2		7	5	5	7	5	4	9
Detroit, Mich	7	12	8	9	12	13	9	18	19	32	40
Hartford, Conn		1	2	4	1	2	2	5	5	4	13
Lexington, Ky	1	2	3	1		1	1	1	5	1	5
Los Angeles, Cal	1	4	6	9	5	11	6	11	13	6	11
Milwaukee, Wis	11	9	11			13	20				33
Nashville, Tenn	1	3	2	2	2	1	3	4	4	3	8
New Orleans, La	3	6	2	8	6	11	12	19	13	10	14
New York, N. Y	64	71	71	83	99	108	141	165	185	251	272
Philadelphia, Pa	32	38	36	36	36	46	60	53	122	141	170
Pittsburgh, Pa		11	11		9	19	22	17	27	33	65
San Francisco, Cal		6				5	9	7	10	7	18
Somerville, Mass		1	1		1	1	1	2	1	5	5

Reports of leprosy, by cities, for 1915.

City.	Reported during 1915.	Died or removed, 1915.	Present Dec. 31, 1915.	Isolated under State control.	Isolated under local control.	Not isolated.
Ann Arbor, Mich	1		1		1	
Boston, Mass	2	2		2		
Chicago, Ill	2	1	1		1	
Detroit, Mich		[1] 1			[1] 1	
Jersey City, N. J	1		1		1	
Kansas City, Mo	1	[2] 1			[2] 1	
Los Angeles, Cal	6		7		[3] 7	
Minneapolis, Minn	1		1	(4)		
Mount Vernon, N. Y	1	(5)				
New Orleans, La	9	9		9		
New York, N. Y	(6)		20		[7] 14	6
Oakland, Cal	1		1		1	
Pawtucket, R. I		[8] 1			[8] 1	
Philadelphia, Pa			1		1	
Pittsburgh, Pa	1	[9] 1			[9] 1	
Portland, Oreg	1	(4)				
Reno, Nev	[10] 1	[10] 1				
Richmond, Va	(11)		[11] 1		1	
Riverside, Cal	1	(12)				
Sacramento, Cal	2		2		2	
St. Louis, Mo	1		2		2	
San Antonio, Tex	1	1	15			15
San Diego, Cal	1	(12)				
San Francisco, Cal	2		14		14	
Tacoma, Wash	1	[13] 1			1	
Tampa, Fla			1			[14] 1
Washington, D. C			[15] 1		1	
Wilkes-Barre, Pa			1		1	

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[1] Patient died in August, 1915.

[2] Patient was reported to Mexico by immigration officials.

[3] Isolated under county control.

[4] Disposition of case not stated.

[5] Was a New York City case—treated by a Mount Vernon physician.

[6] The commissioner of health states: "Unless the case is an open one with discharging lesions and the home conditions are not suitable for adequate medical and nursing care, aside from reporting and tabulating and occasional inspection," no consideration is given.

[7] The commissioner of health states: "Cases desiring hospital treatment are referred to department of public charities and admitted to their several hospitals—not isolated. This city does not segregate such cases."

[8] Patient died in March, 1915.

[9] Detained on premises of municipal hospital from Aug. 14 to Sept. 27, 1915.

[10] Case came from California and was returned to that State.

[11] Was in Richmond from Dec. 20, 1915, but was not reported until Jan. 4, 1916.

[12] Disposition of case not stated.

[13] Patient was a Japanese who had not been in the United States 3 years and was deported after 1 month's isolation.

[14] The health officer states: "In the city of Tampa there is only 1 case, and 2 cases outside of the city limits."

[15] This is the same case which is listed in the State table as being located in the District of Columbia.

LEPROSY.

Special blanks were sent to the health departments of States and to cities having a population of over 10,000 at the time of the 1910 census asking for information regarding the known occurrence of leprosy in their respective jurisdictions during the calendar year 1915. The following table gives the information furnished in the blanks returned. It is probable that there were a few known cases in cities from which no reports were received. Undoubtedly there were also a number of cases which were not reported because their existence was unknown to the health departments.

Reports of leprosy, by States, for 1915.

State.	Reported during 1915.	Died or removed, 1915.	Present Dec. 31, 1915.	Isolated under State control.	Isolated under local control.	Not isolated.
District of Columbia			1		1	
Hawaii	70		670	670		
Louisiana:						
Lepers Home of Louisiana			102	102		
Massachusetts	2		12	12		
Penikese Hospital			12	12		
Michigan			(1)			
Bay City			1			
Big Rapids			1			
Three Rivers			1			
Minnesota	1		10	(2)	(2)	(2)
Albert Lea			1			
Cokato			1			
Elbow Lake			1			
Brown County—						
Linden Township			1			
Maple Bay			1			
Minneapolis			2			
Montevideo			1			
Freeborn County—						
Moscow Township			1			
St. Paul			1			
Oregon	1	[3] 1				
Philippine Islands	841		4,472	3,972	250	250
Culion			3,680	3,680		
San Lazaro			292	292		
Various Provinces			[4] 500		250	250
Porto Rico	3		37	37		
Leprosy colony			37	37		
Tennessee:						
Slayden	1	1				
Washington			(5)			

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[1] The health officer estimates at least 15 cases in Michigan.

[2] The health officer states: "In one sense, none; in another sense, all, because we advise how these cases shall be handled. All cases, however, are practically isolated at home or in some institution. One case is isolated on a county poor farm."

[3] Patient died Oct. 7, 1915.

[4] Estimated.

[5] Some cases at Diamond Head, not under State control.

MALARIA.

Among the major public-health problems confronting the country is that of the control of malaria, one of the diseases taking the greatest toll of the community and at the same time one which can be attacked with the greatest assurance of success and usually with moderate effort and expense. Comparatively little attention has been given to the control of this disease. Almost without exception health agencies have not even made an effort to ascertain the extent and nature of the problem within their respective jurisdictions.

As to the geographic distribution of malaria in the United States at the present time, there are three principal well-recognized endemic areas—one large area and two smaller ones. The large endemic area covers the whole southeastern portion of the United States, having for its southern boundary the Gulf of Mexico; for its western boundary, a line drawn from Eagle Pass on the Rio Grande to Leavenworth, Kans.; for its eastern boundary, the Atlantic seaboard; its northern boundary, a line drawn from Leavenworth, Kans., eastward some distance north of the Ohio River and to the Atlantic on a line with the northern boundary of Maryland. Of the two smaller endemic areas, one includes a section of the northern part of New Jersey, southeastern New York, Connecticut, Rhode Island, and part of the State of Massachusetts. The third recognized endemic area is in California, and includes the Sacramento and San Joaquin Valleys which occupy a large portion of the central part of the State. As indicated by reports received from State and city health departments, and the records of Army posts, there are endemic areas scattered here and there in many other States.

The community is prone to be interested in the unusual and little known, and to give small attention to the commonplaces of daily occurrence. In many sections of the country malaria constitutes the most common cause of sickness. Usually, however, it appears as a small factor in the mortality records. This may be the reason why the disease has aroused so little community effort. The absence of the disease from an important position in death records is as unfortunate as the conclusions drawn from it are fallacious. In areas where malaria is especially prevalent, it is probably the greatest of any of the mortality factors. Although it may not be the immediate cause of death, it injures and weakens those who contract it year after year or become chronically affected so that minor ailments, which would not be serious for a normal healthy individual, frequently cause death. Malaria shortens the average length of life.

During the last four years systematic work was carried on by the late Surg. von Esdorf, at New Orleans, La., to collect data of the prevalence and geographic distribution of malaria in the Southern States. This was carried on by sending to practicing physicians every three months a reply postal card, asking for a statement of the number of new cases of malarial fevers occurring among their patients during each month of the preceding quarter, with a statement as to whether the diagnosis was confirmed by the use of the microscope.

During the calendar year 1915 and the first six months of 1916 circular cards were sent to the physicians of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee, and eastern Texas. During this period 162,931 cards were sent to physicians and 20,526 replies received. The percentage of the number of replies to the number of cards sent out was 12.60. The number of cases of malaria reported in this way was 154,634. There were also reported 110 cases of hemoglobinuric fever, There is appended a table showing the occurrence of malaria recorded in the several States through morbidity reports and death registration. There were 522 reported cases in California, with 49 deaths. This indicates an incomplete reporting of cases and some mistaken diagnoses in the recorded deaths. In Alabama the 80 recorded cases and 500 recorded deaths indicate very incomplete reporting of cases and either a very great prevalence of the disease or many mistaken diagnoses registered in death certificates. The 194 cases with 26 deaths in Kansas indicate incomplete reporting of cases and a considerable prevalence of the disease. The 1,132 deaths in Porto Rico in a population estimated to be a little more than a million indicates that the disease is a public health problem of importance. The same is indicated to a lesser degree by the 906 recorded cases and 447 registered deaths in South Carolina.

The 153,565 cases recorded in Mississippi and the 12,983 cases in Virginia probably serve mainly to show the practicing physicians' belief in the prevalence of the disease in these two States. In these States the data was collected by having the physicians report the first of each month the number of cases of the disease treated during the preceding month, the reports being made out in many instances undoubtedly from memory.

The table on page — gives a summary of the numbers of cases of malaria reported during the year 1915, on reply postal cards sent to practicing physicians in the States included.

Malaria—Cases reported, by months, 1915.

	Estimated population July 1, 1915.	January.		February.		March.		April.		May.		June.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Alabama	2,301,277	2	8	4	7	1	9	5	21	16	44	5	46
California	2,848,275	12	1	4	3	41	4	9	9	41	8	60	2
Kansas	1,807,221	....	1	....	1	....	....	....	....	3	2	....	....
Maryland	1,351,941	3	....	....	....	....	....	4	....	1	....	5	....
Minnesota	2,246,761	....	....	....	....	....	....	....	....	....	....	....	....
Mississippi	1,926,778	4,063	....	4,194	....	4,620	....	6,078	....	7,092	....	10,703	....
New Jersey	2,881,840	3	....	6	....	3	....	14	....	42	....	96	....
Ohio	5,088,627	....	....	....	....	1	....	4	....	7	....	4	....
Porto Rico	[1] 1,184,489	88	98	78	67	95	54	51	60	52	72	37	71
South Carolina	1,607,745	18	8	86	13	68	7	25	19	129	21	77	42
Virginia	2,171,014	474	....	691	....	500	....	693	....	685	....	1,030	....

	July.		August.		September.		October.		November.		December.		Total cases, 1915.	Total deaths, 1915.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.		
Alabama	11	59	16	76	6	77	8	79	5	43	1	31	80	500
California	29	3	122	6	95	4	49	4	14	....	46	5	522	49
Kansas	4	3	5	4	6	6	16	6	10	1	150	2	194	26
Maryland	8	....	15	....	10	....	18	....	2	....	1	....	67	....
Minnesota	....	....	....	....	....	....	1	....	....	....	....	....	1	....
Mississippi	18,301	....	25,998	....	32,532	....	21,654	....	11,764	....	6,566	....	153,565	....
New Jersey	72	....	61	....	69	....	77	....	8	....	7	....	458	17
Ohio	3	....	3	....	3	....	9	....	2	....	1	....	37	....
Porto Rico	18	77	73	101	48	102	91	133	100	162	250	135	981	1,132
South Carolina	130	56	120	60	143	92	87	101	....	28	23	....	906	447
Virginia	1,469	....	2,015	....	2,665	....	1,857	....	519	....	385	....	12,983	....

[1] Estimated as of July 1, 1914.

Malaria—Reported prevalence in certain States during 1915.

State.	Inquiry cards sent to physicians.	Replies received.	Counties not heard from.	Counties represented in replies.	Cases of malaria reported.
Jan. 1 to Mar. 31:					
Alabama	7,050	926	0	67	1,168
Arkansas	6,900	1,248	1	74	2,359
Kentucky	10,500	1,798	0	120	860
Louisiana	7,500	692	2	63	1,456
North Carolina	5,547	780	9	91	820
South Carolina	3,825	611	1	43	763
Tennessee	10,014	1,137	7	89	572
Apr. 1 to June 30:					
Alabama	2,350	307	2	65	1,780
Arkansas	2,300	326	2	73	4,327
Florida	976	108	14	36	835
Georgia	3,022	348	43	105	1,491
Kentucky	3,500	464	10	110	894
Louisiana	2,070	320	5	60	2,754
North Carolina	1,849	268	21	79	1,300
South Carolina	1,275	131	8	36	1,732
Tennessee	3,338	279	21	65	740
Texas	3,450	584	17	93	6,786
July 1 to Sept. 30:					
Alabama	2,350	257	4	63	4,535
Arkansas	2,300	348	2	73	18,950
Florida	976	168	10	43	2,044
Georgia	3,022	290	50	98	2,254
Kentucky	3,500	540	10	110	2,750
Louisiana	2,070	191	16	49	5,133
North Carolina	1,849	331	13	87	2,644
South Carolina	1,275	166	9	35	2,743
Tennessee	3,338	230	23	73	1,628
Texas (eastern part)	3,450	576	14	96	21,382
Oct. 1 to Dec. 31:					
Alabama	2,350	294	5	62	1,929
Arkansas	2,300	282	5	70	6,233
Florida	976	155	12	40	1,101
Kentucky	3,500	630	7	113	1,564
Louisiana	2,070	191	15	49	3,244
North Carolina	1,849	380	10	90	1,839
South Carolina	1,275	137	9	35	1,004
Tennessee	3,338	146	31	65	626
Texas (eastern part)	3,450	492	19	92	11,597

MALTA OR MEDITERRANEAN FEVER.

A case of Malta fever developed at the United States Immigration Station at Boston, Mass., in a boy, aged 13 years, a native of Sicily, who had come from Campobello and arrived at Boston August 6, 1915. A case was also reported, April, 1916, in a goat herder in the vicinity of Capitan, N. Mex.

MEASLES.

Measles is common in most countries and has come to be considered a necessary evil. The infection is so broadcast that few individuals attain adult life without being attacked. The infection, introduced into a community where there are a considerable number of children who have not had the disease, sweeps through the community, under favorable conditions, infecting all the susceptible individuals or so large a proportion of them that it dies out for sheer lack of material. This action may be likened to a forest fire which sweeps over a locality and becomes extinguished only when it has consumed all the inflammable material within its reach. These periods of prevalence of measles, frequently called outbreaks or epidemics, leave the community immune to the disease until another crop of susceptible material, usually in the form of young children, makes its appearance. This, like a new growth of timber, furnishes fuel for another conflagration or outbreak. In large communities these periodical epidemics occur usually at more or less regular intervals.

Measles is one of the diseases which, while quite generally notifiable, are not reported with equal completeness in different localities. The reports of cases in some cities are exceedingly good. In others they are worthless. The result is that the reported cases and the indicated case rates, as well as the indicated fatality rates, are more likely to reflect the efficiency of the health department in enforcing its regulations than they are to reflect the varying prevalence of the disease.

The highest reported case rates for measles for the calendar year 1915 were those for the State of New York, the Territory of Hawaii, and the District of Columbia, with 6.21, 5.53, and 5.41, respectively, per 1,000 population. The lowest case rates among the States reporting were those for South Carolina, Texas, and Louisiana, with 0.03, 0.04, and 0.06, respectively.

Among the larger cities the rates in some instances were considerable higher than those reported for States, the highest rates for cities over 100,000 population being those for Los Angeles, Syracuse, and Trenton, with 12.61, 11.46, and 11.32, respectively, per 1,000 population. The low rates of 0.11 for Louisville, Ky., 0.17 for Nashville, Tenn., and 0.25 for Richmond, Va., may possibly mean nothing more than incomplete notification of cases.

The high fatality rates indicated in the reports for Arizona, Texas, and South Carolina being 51.22, 29.27, and 8.70, respectively, per 100 reported cases probably signify that not all cases were reported. The low-case rates reported for South Carolina, Texas, and Louisiana may also indicate incomplete notification of cases. The lowest fatality rates for States were 0.19 in Wyoming, 0.23 in West Virginia, and 0.26 in the District of Columbia.

Of the cities of over 100,000 population the highest fatality rates per 100 cases notified were for Providence, R. I., 8.70; Detroit, Mich., 6.98; and Bridgeport, Conn., 4.80, all of which are high enough to suggest that reporting of cases was incomplete. The lowest rates reported were for Los Angeles, 0.15; Camden, 0.17; and Washington, 0.26.

Measles—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality, per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality, per cent.
Alabama	2,301,277	1,333	47	0.579	3.53	....	....	....	....
Arizona	247,299	41	21	.166	[2] 51.22	59	11	0.247	[2] 18.64
California	2,848,275	13,114	128	4.604	.97	8,852	150	3.210	1.69
Connecticut	1,223,583	3,499	56	2.860	1.60	4,843	146	4.027	3.01
District of Columbia	358,679	1,940	5	5.409	.26	947	1	2.680	.11
Hawaii	231,210	1,279	31	5.532	2.42	57	1	.274	1.75
Illinois	6,069,519	....	....	....	....	13,295	220	2.221	1.65
Indiana	2,798,142	[3] 7,922	73	2.831	.92	[3] 12,074	147	4.344	1.22
Kansas	1,807,221	7,118	65	3.939	.91	3,903	90	2.187	2.31
Louisiana	1,801,306	99	(4)	.055	....	794	9	.448	1.13
Maryland[5]	1,351,941	2,895	(4)	2.141	....	2,000	19	1.491	.95
Michigan	3,015,442	3,743	94	1.241	2.51	9,177	169	3.084	1.84
Minnesota	2,246,761	[3] 3,210	(4)	1.429	....	2,460	74	1.111	3.01
Mississippi	1,926,778	2,951	(4)	1.532	....	17,967	328	9.447	1.83
Montana	446,054	....	....	....	....	2,821	16	6.521	.57
Nevada	102,730	18	(4)	.175	....	....	....	....	....
New Jersey	2,881,840	....	....	....	....	240	(4)	.085	....
New York	10,086,568	62,660	834	6.212	1.33	47,883	832	4.837	1.74
Ohio	5,088,627	19,388	(4)	3.810	....	16,191	(4)	3.221	....
Oklahoma	2,114,307	939	11	.444	1.17	....	....	....	....
Oregon	809,490	399	6	.493	1.50	3,027	50	3.865	1.65
Philippine Islands	8,650,937	....	....	....	....	103	418	....	....
Rhode Island	602,765	....	....	....	....	816	60	1.380	7.35
South Carolina	1,607,745	46	4	.029	8.70	4,230	(4)	2.660	....
South Dakota	680,046	....	....	....	....	543	7	.821	1.29
Texas	4,343,710	164	48	.038	29.27	....	....	....	....
Utah	424,300	172	4	.405	2.33	2,019	8	4.871	.40
Vermont	362,452	361	3	.996	.83	434	2	1.202	.46
Virginia	2,171,014	3,990	(4)	1.838	....	....	....	....	....
Washington	1,471,043	[3] 1,443	16	.981	1.11	[3] 4,281	49	3.041	1.14
West Virginia	1,359,474	427	1	.314	.23	....	....	....	....
Wisconsin	2,473,533	4,425	24	1.789	.54	6,109	83	2.497	1.36
Wyoming	174,148	540	1	3.101	.19	444	6	2.631	1.35

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] A fatality rate as high as this indicates that the cases have not been completely reported.
[3] The health officer states that cases are known not to be completely reported.
[4] Deaths were not reported.
[5] Maryland figures for 1914 are exclusive of Baltimore city.

MENINGITIS (EPIDEMIC CEREBROSPINAL).

During the calendar year 1915 there were 21 States which kept records of cerebrospinal meningitis and furnished the figures to the bureau. Of these States those reporting the greatest number of cases were New York, with 288 cases; Virginia, with 272 cases; and Ohio, with 187 cases. Wisconsin had 74 cases reported as cases, but there were 336 cases recorded only as deaths.

Among the larger cities, 174 cases were reported in New York, 91 cases in Chicago, 46 in Boston, 45 in Cleveland, 29 in Philadelphia, and 28 each in Buffalo and Cincinnati.

Meningitis—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	38	13	0.017	34.21				
Arizona	247,299	1	(2)	.004		8	(2)	0.033	
California	2,848,275	46	22	.016	47.83	70	40	.025	57.14
Connecticut	1,223,583	35	17	.029	48.57	31	20	.026	64.52
District of Columbia	358,679	5	5	.014	100.00	8	5	.023	62.50
Hawaii	231,210	3	(2)	.013		9	4	.043	44.44
Illinois	6,069,519					196	80	.033	40.82
Indiana	2,798,142	[3] 71	59	.025	83.10	72	74		
Iowa	2,221,038					19	31		
Kansas	1,807,221	[3] 36	(2)	.020		31	(2)	.017	
Louisiana	1,801,306	12	1	.007	8.33	66	22	.037	33.33
Maryland[4]	1,351,941	57	(2)	.042		39	(2)	.029	
Minnesota	2,246,761	[3] 35	14	.016	40.00	21	12	.009	57.14
Mississippi	1,926,778	67	(2)	.018		61	13	.032	21.31
Montana	446,054					12	65		
Nevada	102,730	10	10	.097	100.00				
New York	10,086,568	288	265	.029	92.01	446	360	.045	80.72
Ohio	5,088,627	187	(2)	.037		201	(2)	.040	
Oregon	809,490					5	1	.006	20.00
Philippine Islands	8,650,937					5	79		
South Carolina	1,607,745	14	50			19	(2)	.012	
South Dakota	680,046					9	46		
Texas	4,343,710	30	32						
Virginia	2,171,014	272	(2)	.125					
Washington	1,471,043	13	39			21	(2)	.015	
West Virginia	1,359,474	13	9	.010	69.23				
Wisconsin	2,473,533	74	336			75	(2)	.031	
Wyoming	174,148					2	2	.012	100.00

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] Deaths were not reported.
[3] The health officer states that cases are known not to be completely reported.
[4] Maryland figures for 1914 are exclusive of Baltimore City.

PLAGUE.

HUMAN PLAGUE.

A case of plague in man occurred at Martinez, Cal., July 13, 1915. August 27, 1915, a case in man developed in New Orleans. At Honokaa, Hawaii, a death from plague occurred December 2, 1915. At Paauhau, Hawaii, one case was reported June 29 and one December 16.

RODENT PLAGUE.

Since more has been learned regarding plague, it has not been the menace to man that it formerly was. During the period from July 1, 1915, to June 30, 1916, 70 plague-infected rats have been found in New Orleans and 3 infected rats in Seattle. Plague-infected ground squirrels to the number of 138 were found in California.

POLIOMYELITIS IN NEW YORK CITY.

There has been an epidemic of poliomyelitis (infantile paralysis) in New York City. It began in the Borough of Brooklyn on May 9, 1916, 20 cases appearing between that time and the end of the month. Only 2 of these cases were reported to the health department during the month of May, the first group of cases of sufficient size to attract attention being reported on June 8. The investigation, started as a result of these reports, disclosed the presence of a considerable number of cases in Brooklyn, and on June 17 it was recognized and announced in the public press that the disease was unduly prevalent. The number of cases reported from Brooklyn increased rapidly during the month of June and on July 11 reached a maximum of 151 reported cases. The number of cases reported from Brooklyn began to decrease rapidly following the high peak of July 11, and on July 21 reached a low point of 36 reported cases. The number of cases again began to increase, however, and for some time ranged around a total of approximately 70 cases per day.

The number of cases in Manhattan Borough, which had remained low during June, began to increase in the early days of July and continued to increase, a maximum of 76 cases being reported on August 3. The cases reported from Manhattan averaged approximately 50 per day during the week ending August 5.

Richmond Borough, though the smallest of the boroughs of the city and in some respects farthest removed from direct connection with the rest of the city, showed a high incidence of the disease.

The number of cases in the Borough of Queens did not begin to increase markedly until about July 1, but after that time cases began to be reported in considerable numbers. The Borough of The Bronx showed only a small number of cases until the last week of July, when the number of cases began to increase, 19 cases being reported on August 6.

While the outbreak started apparently in an Italian quarter of the city, and Italians largely predominated in the early reported cases, in the subsequent course of the epidemic the racial distribution of the cases has varied with the population of the quarter most heavily infected, and so far no race has shown marked susceptibility or immunity to the infection.

The outbreak began to subside about the middle of August. The accompanying tables show the number of cases reported up to August 26, 1916, by weeks and boroughs, and up to August 20 by age and boroughs.

Poliomyelitis in New York City, by weeks and boroughs.

Week ended—	Total for the city.	Brooklyn.	Manhattan.	Richmond.	Queens.	Bronx.
May 13	1		1			
20						
27	1	1				
June 3	2	1	1			
10	11	8	2		1	
17	15	11	4			
24	97	90	5	1	1	
July 1	269	221	30	8	7	3
8	557	419	73	38	11	16
15	979	710	127	48	70	24
22	795	494	117	60	98	26
29	962	497	246	39	128	52
Aug. 5	1,162	561	350	36	161	54
12	1,210	568	334	16	203	89
19	922	338	322	15	164	83
26	743	235	307	15	110	76
Total	7,726					

Poliomyelitis in New York City, by age and boroughs, to Aug. 20.

	Under 1 year.		1–5 years.		6–10 years.		11–15 years.		Over 15 years.		Total, all ages.[1]
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	
Manhattan	215	14.4	1,086	72.8	122	8.1	29	2.0	40	2.7	1,492
Bronx	40	10.0	297	73.9	52	12.9	8	2.0	5	1.2	402
Brooklyn	272	8.2	2,653	79.7	303	9.1	61	1.8	39	1.2	3,328
Queens	67	9.0	546	73.7	103	13.9	19	2.6	6	.8	741
Richmond	18	6.8	206	78.0	30	11.4	7	2.6	3	1.2	264
Total	612	9.8	4,788	76.9	610	9.8	124	2.0	93	1.5	6,227

[1] This compilation includes only cases reported up to Aug. 20, and figures for the last week of this period are incomplete.

OCCURRENCE OF MULTIPLE CASES IN FAMILIES.

Of the first 7,000 cases a certain proportion included were of the so-called "abortive" type; that is, showing no definite paralysis, but with other symptoms or findings sufficient to justify a positive diagnosis of poliomyelitis.

These 7,000 cases occurred in 6,748 families, as follows:

	Families.	Cases.	Per cent of total families affected.
1 case in family	6,521	6,521	96.63
2 cases in family	205	410	3.04
3 cases in family	20	60	.30
4 cases in family	1	4	.014
5 cases in family	1	5	.014
Total	6,748	7,000	99.998

PREVALENCE OUTSIDE OF NEW YORK CITY.

Poliomyelitis, with a few minor exceptions, did not spread in epidemic form far from New York City. The outside communities chiefly involved were the New Jersey cities in the vicinity of New York, particularly Newark, where over 1,000 cases were reported. Philadelphia was also invaded and had several hundred known cases. To September 5, Chicago had 146 cases, but this is not a large number when the population of the city is considered. Toledo, Ohio, to September 2, had 85 cases. This constituted a considerable number for a city of the size of Toledo and probably indicated the presence of the disease in epidemic form.

The prevalence of the disease, as indicated by reported cases, is shown in the accompanying tables by cities and States. These tables are made up from reports made to the Public Health Service by the health departments of the respective cities and States.

REPORTED PREVALENCE IN CITIES.

The following table gives the reported prevalence of poliomyelitis (infantile paralysis) up to the first part of September, 1916, in cities in which five or more cases had been reported in any one week:

City.	Period covered.	Number of cases reported.
Atlantic City, N. J	July 12 to Sept. 2	19
Baltimore, Md	July 2 to Sept. 2	39
Bayonne, N. J	June 25 to Sept. 5	41
Birmingham, Ala	July 2 to Aug. 26	14
Boston, Mass	do	32
Bridgeport, Conn	July 16 to Sept. 2	27
Camden, N. J	July 1 to Sept. 5	49
Chicago, Ill	June 18 to Sept. 2	146
Cincinnati, Ohio	July 9 to Sept. 2	18
Cleveland, Ohio	June 25 to Sept. 2	22
Detroit, Mich	July 9 to Sept. 2	18
East Orange, N. J	July 1 to Sept. 4	40
Flint, Mich	July 23 to Aug. 26	19
Harrison, N. J	July 1 to Aug. 31	34
Haverhill, Mass	July 2 to Sept. 2	7
Jersey City, N. J	do	148
Kearny, N. J	July 1 to Sept. 4	32
Long Branch, N. J	July 23 to Sept. 2	14
Memphis, Tenn	Aug. 6 to Sept. 2	8
Minneapolis, Minn	July 30 to Aug. 26	42
Montclair, N. J	July 1 to Sept. 4	18
Newark, N. J	June 18 to Sept. 4	1,072
New York, N. Y	June 4 to Sept. 7	8,399
North Adams, Mass	July 16 to Sept. 2	12
Northampton, Mass	July 30 to Sept. 2	9
Orange, N. J	July 1 to Sept. 4	78
Perth Amboy, N. J	July 2 to Sept. 2	25
Philadelphia, Pa	June 25 to Sept. 2	503
Pittsburgh, Pa	July 2 to Sept. 2	21
Pittsfield, Mass	July 9 to Sept. 2	14
Plainfield, N. J	July 1 to Aug. 29	26
Providence, R. I	July 2 to Sept. 2	29
St. Louis, Mo	June 11 to Sept. 2	12
St. Paul, Minn	July 2 to Aug. 26	40
Somerville, Mass	July 23 to Sept. 2	10
Springfield, Mass	July 23 to Sept. 1	16
Stamford, Conn	July 30 to Aug. 5	8
Syracuse, N. Y	July 30 to Aug. 26	43
Toledo, Ohio	June 18 to Sept. 2	85
Trenton, N. J	July 9 to Sept. 2	33
Washington, D. C	July 9 to Sept. 5	22
West Hoboken, N. J	July 1 to Sept. 5	40

REPORTED PREVALENCE BY STATES.

Poliomyelitis—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	8	12	....	....	....	....	....	....
Arizona	247,299	2	1	0.008	50.00	1	(2)	0.004	....
California	2,848,275	62	19	.022	30.65	56	26	.020	46.43
Connecticut	1,223,583	34	4	.029	11.43	11	2	.009	18.18
District of Columbia	358,679	6	2	.017	33.33	8	1	.023	12.50
Hawaii	231,210	2	3	....	....	5	2	.024	40.00
Illinois	6,069,519	....	....	....	....	142	35	.024	24.65
Indiana	2,798,142	[3] 36	17	.013	47.22	58	28	.021	48.27
Iowa	2,221,038	....	....	....	....	19	16	.009	84.21
Kansas	1,807,221	48	15	.027	31.25	25	13	.014	52.00
Louisiana	1,801,306	9	(2)	.005	....	7	(2)	.004	....
Maryland[4]	1,351,941	66	(2)	.049	....	12	(2)	.009	....
Michigan	3,015,442	71	30	.024	42.25	49	28	.016	57.14
Minnesota	2,246,761	[3] 127	26	.057	20.47	19	13	.009	68.42
Mississippi	1,926,778	85	(2)	.044	....	113	23	.059	20.35
Montana	446,054	....	....	....	....	2	(2)	.005	....
Nevada	102,730	2	1	.019	50.00	....	....	....	....
New Jersey	2,881,840	36	(2)	.012	....	32	(2)	.011	....
New York	10,086,568	257	43	.026	16.73	224	70	.023	31.25
Ohio	5,088,627	466	(2)	.092	....	63	(2)	.013	....
Oregon	809,490	1	(2)	.001	....	....	....	....	....
South Carolina	1,607,745	2	(2)	.001	....	21	(2)	.013	....
Texas	4,343,710	8	....	.002	....	....	....	....	....
Vermont	362,452	42	17	.116	40.48	301	52	.833	17.28
Virginia	2,171,014	241	(2)	.111	....	....	....	....	....
Washington	1,471,043	10	3	.007	30.00	21	9	.015	42.86
Wisconsin	2,473,533	14	11	.006	78.57	31	11	.013	35.48

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] Deaths were not reported.
[3] The health officer states that cases are known not to be completely reported.
[4] Maryland figures for 1914 are exclusive of Baltimore City.

RELAPSING FEVER.

A case of relapsing fever was reported at Denver, Colo., July 24, 1915. Spirochætes were found in the patient's blood. From the history the disease was apparently contracted at a mountain camp 25 miles from the city. Three other persons resident at the camp had similar attacks of illness which were undoubtedly relapsing fever. The fifth case of illness in a person residing near the camp was also believed to be relapsing fever. The daughter of the first reported patient, who nursed her mother and had not been out of Denver, had an attack of the disease and spirochætes were also found in her blood. The original infection was believed to have been contracted from a band of gypsies which had stopped some hours at the mountain camp referred to.

Relapsing fever undoubtedly occurs from time to time in the United States. Cases of the disease are occasionally found in arriving immigrants, and while the infected in these instances are detained and cared for as long as they harbor the infection the probabilities are that infected persons occasionally pass the immigration inspector without detection. Physicians throughout the country should familiarize themselves with the symptoms of the disease and keep on the lookout for cases. Wherever suspected the diagnosis should be confirmed by blood examination.

SCARLET FEVER.

Scarlet fever is present throughout all parts of the country at some time during the year. The virulence of the disease varies in different outbreaks and in different localities. There is a general impression that the disease is milder in the Southern States than in the Northern.

The State reporting the greatest number of cases in proportion to the population was Nevada where, during the calendar year 1915, 2.5 cases were reported per 1,000 inhabitants. The District of Columbia came second, with 2.2 cases per 1,000 inhabitants, and Ohio, third, with 1.8. It is probable that the disease was not more prevalent in these States than in some others, but simply that it was more completely reported. However, the disease must have been very common in Nevada to have had so many cases reported.

The indicated fatality rates derived by comparing the reported cases to the registered deaths were lowest in Vermont, with a fatality rate of 0.96 per 100 cases; the District of Columbia, with a rate of 1.01; and the State of Washington, with a rate of 1.03. This simply means that the numbers of cases of scarlet fever reported in these States for each death registered as due to the disease was large. It shows that the cases were relatively well reported.

Some of the larger cities gave rates of prevalence considerably higher than those of the States. This may have been due to more complete reporting of the cases. Dayton, Ohio, had an indicated case rate of 4.2 per 1,000 population; Boston, Mass., a rate of 3.7; and St. Paul, Minn., one of 3.5.

The indicated fatality rates in some of the cities was very low, the lowest being Richmond, Va., with a rate of 0.4 per 100 cases; the next lowest, Seattle, Wash., with a rate of 0.7; and Kansas City, Mo., with one of 0.8. Ordinarily the disease seems to have a fatality rate under 1 per cent.

Scarlet fever—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	705	40	0.306	5.67	.....	.....	.....	.....
Arizona	247,299	65	2	.263	3.08	69	9	0.287	13.04
Califorina	2,848,275	[2] 2,893	53	1.016	1.83	2,831	83	1.027	2.93
Connecticut	1,223,583	1,641	31	1.341	1.89	1,969	81	1.637	4.11
District of Columbia	358,679	794	8	2.214	1.01	311	1	.880	.32
Hawaii	231,210	13	2	.056	15.38	8	1	.038	12.50
Illinois	6,069,519	.....	.....	.....	.....	7,921	403	.067	5.09
Indiana	2,798,142	[2] 4,065	93	1.453	2.29	4,522	110	1.627	2.43
Iowa	2,221,038	.....	.....	.....	.....	1,074	67	.483	6.24
Kansas	1,807,221	1,478	35	.818	2.37	854	35	.478	4.10
Louisiana	1,801,306	99	(3)	.055	.....	204	2	.115	.98
Maryland [4]	1,351,941	2,411	(3)	1.783	.....	1,655	42	1.234	2.54
Michigan	3,015,442	3,007	101	.997	3.36	3,162	179	1.062	5.66
Minnesota	2,246,761	[2] 3,962	138	1.763	3.48	6,403	321	2.892	5.01
Mississippi	1,926,778	387	(3)	.201	.....	325	4	.171	1.23
Montana	446,054	.....	.....	.....	.....	701	25	1.620	3.57
Nevada	102,730	262	5	2.550	1.91	.....	.....	.....	.....
New Jersey	2,881,840	4,667	97	1.619	2.08	6,386	242	2.268	3.79
New York	10,086,568	15,802	409	1.567	2.59	18,696	682	1.889	3.65
Ohio	5,088,627	9,173	(3)	1.803	.....	7,526	(3)	1.497	.....
Oklahoma	2,114,307	2,312	49	1.094	2.12	.....	.....	.....	.....
Oregon	809,490	385	5	.476	1.30	437	13	.558	2.97
Philippine Islands	8,650,937	.....	.....	.....	.....	2	64	.....	.....
Porto Rico	1,184,489	.....	.....	.....	.....	3	2	.003	66.66
Rhode Island	602,765	.....	.....	.....	.....	1,082	42	1.830	3.88
South Carolina	1,607,745	277	7	.172	2.53	207	(3)	.130	.....
South Dakota	680,046	.....	.....	.....	.....	425	11	.642	2.59
Texas	4,343,710	1,711	56	.394	3.27	.....	.....	.....	.....
Utah	424,300	586	9	1.381	1.54	968	13	2.335	1.34
Vermont	362,452	313	3	.864	.96	406	12	1.124	2.96
Virginia	2,171,014	2,116	(3)	.975	.....	1,849	39	.860	2.11
Washington	1,471,043	679	7	.462	1.03	785	22	.558	2.80
West Virginia	1,359,174	382	5	.281	1.31	.....	.....	.....	.....
Wisconsin	2,473,533	1,991	68	.805	3.42	3,194	185	1.305	5.79
Wyoming	174,148	190	31	1.091	16.32	114	6	.676	5.26

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] The health officer states that cases are known not to be completely reported.
[3] Deaths were not reported.
[4] Maryland figures for 1914 are exclusive of Baltimore City.

SEVEN-DAY FEVER.

Cases of seven-day fever were reported in San Juan, Porto Rico, in October, 1915, by Asst. Surg. Gen. H. R. Carter.

SMALLPOX.

The mild type of smallpox continued prevalent throughout the United States during the calendar year 1915. It was especially prevalent in the Southern, Central, and Western States, and in this territory wherever reliable records were kept many cases were recorded. In Indiana there were over 3,000 recorded cases, with 10 deaths; in Kansas, 2,800 cases, with 8 deaths; in Ohio, 3,200 cases; Oklahoma, 3,700 cases; and Wisconsin, 1,800 cases.

In Texas both mild and virulent types of smallpox were present. The infection of virulent smallpox is repeatedly found in territory adjacent to the Mexican border. In Texas there were 2,037 reported cases, with 101 deaths. Outbreaks of the virulent type of the disease were reported at San Antonio, Brownsville, and El Paso. At El Paso there were 96 cases, with 27 deaths reported. At Laredo there was between January 1 and May 1 a total of 207 reported cases, with 32 deaths.

At New Orleans there were 72 cases during the year, with 5 deaths. The virulent type of the disease was present during the month of June.

In Massachusetts a virulent outbreak occurred at New Bedford during May, June, and July, 1915. During this time 23 cases of smallpox were reported, of which 10 terminated fatally, giving a fatality rate of 43.3 per cent. The disease was distinctly of the virulent type. The eruption in 11 of the cases was reported to have been confluent and in 4 hemorrhagic. The original source of the infection was not discovered.

At Chattanooga, Tenn., there were 73 cases reported, with 31 deaths.

PORTO RICO.

On May 4, 1916, the presence of smallpox in San Juan, P. R., was announced by the director of sanitation, and this announcement was soon followed by reports of cases from other places in Porto Rico, particularly Trujillo Alto, a small town about 12 miles eastward from San Juan. To June 17 the following cases had been reported, but it is now known that a considerable number of cases had occurred in San Juan prior to the above date.

Cases reported to June 17, 1916.

Arecibo	14	Loiza	39
Arroyo	8	Mayaguez	13
Barceloneta	4	Patillas	1
Barros	3	Rio Piedras	10
Bayamon	14	San Juan	242
Caguas	4	San Lorenzo	4
Camuy	1	Trujillo Alto	100
Carolina	2	Utuado	4
Cataño	2	Vega Baja	1
Cidra	2	Vieques	1
Fajardo	3	Yabucoa	1
Gurabo	18		
Humacao	2	Total	502
Juncos	9		

The form of the disease was mild as a rule, so much so that it led some persons unfamiliar with the disease in its mild forms to raise the question of its being genuine smallpox.

The general vaccination under the early military government attempted to include the entire population of the island, but unquestionably thousands of persons managed to avoid it. During the succeeding years more or less vaccinations were done, sometimes many thousands, but the increase of population by birth and immigration has exceeded the number of vaccinations, hence there has been a varying but constant increase in the number of persons nonimmune to smallpox, which number has further been augmented by those whose immunity conferred by vaccination has gradually worn off.

Smallpox—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Total cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Total cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	775	4	0.337	0.52				
Arizona	247,299	91	4	.368	4.40	68	7	0.284	10.29
California	2,848,275	336	3	.118	.89	777	1	.282	.13
Connecticut	1,223,583	22		.018		95		.079	
District of Columbia	358,679	15		.042		150		.424	
Illinois	6,069,519					3,956	2	.661	.05
Indiana	2,798,142	[2] 3,456	10	1.235	.29	4,036	7	1.452	.17
Iowa	2,221,038					3,155	10	1.420	.32
Kansas	1,807,221	2,861	8	1.583	.28	1,616	7	.905	.43
Louisiana	1,801,306	350		.194		585	1	.330	.17
Maryland [3]	1,351,941	94		.070		216	5	.161	2.31
Michigan	3,015.442	918	5	.304	.54	1,426	2	.479	.14
Minnesota	2,246,761	[2] 1,708	3	.760	.18	1,847	6	.834	.32
Mississippi	1,926,778	2,461		1.277		1,173	7	.617	.60
Montana	446,054					1,264	5	2.922	.40
Nevada	102,730	83		.808					
New Jersey	2,881,840	152		.053		23	1	.008	4.35
New York	10,086,568	155		.015		791	3	.080	.38
Ohio	5,088,627	3,221		.633		4,789		.953	
Oklahoma	2,114,307	3,743	16	1.770	.43				
Oregon	809,490	579	4	.715	.69	464	2	.592	.43
Philippino Islands	8,650,937	151	430						
South Carolina	1,607,745	394	2	.245	.51	634		.399	
South Dakota	680,046					1,228	1	.299	.81
Texas	4,343,710	2,037	101	.469	4.96				
Utah	424,300	456		1.075		1,139	2	2.748	.18
Vermont	362,452	214	1	.590	.47	25		.069	
Virginia	2,171,014	1,097		.505		3,176	18	1.477	.57
Washington	1,471,043	254	2	.173	.79	749	3	.532	.40
West Virginia	1,359,474	1,450	2	1.067	.14				
Wisconsin	2,473,533	1,817	6	.735	.33	3,302	3	1.350	.09
Wyoming	174,148	59	3	.339	5.08	86		.510	

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] The health officer states that cases are known not to be completely reported.
[3] Maryland figures for 1914 are exclusive of Baltimore City.

VACCINATION STATUS OF REPORTED CASES.

A number of State departments of health endeavor to ascertain the vaccination histories of all persons contracting smallpox. The following gives a summary of the vaccination status of such persons in these States for the calendar years 1914 and 1915, and the available information for 1912 and 1913:

State and year.	Cases reported.	Vaccination history of cases.					Remarks.
		Deaths.	Number vaccinated within seven years preceding attack.	Number last vaccinated more than seven years preceding attack.	Number never successfully vaccinated.	Vaccination history not obtained or uncertain.	
1915.							
California	336	....	11	25	256	44	
Kansas	2,855	....	16	77	1,154	1,608	
Maryland	82	....	....	2	80	....	
Massachusetts	22	9	1	4	3	14	
Michigan	859	....	6	26	748	79	
Minnesota	1,646	2	28	92	1,328	198	
New York	118	....	12	11	72	23	
Ohio	3,048	....	20	65	1,518	1,445	
Wisconsin	1,826	8	145	190	821	670	
Total	10,792	19	239	492	5,980	4,081	
1914.							
California	638	....	17	49	350	222	
District of Columbia	27	....	4	3	20	....	
Maryland (exclusive of Baltimore)	214	1	1	3	210	....	
Massachusetts	24	2	6	4	12	2	
Michigan	1,244	1	7	41	998	198	
Minnesota	1,732	....	22	105	1,186	419	
New York	730	....	38	33	553	106	
Ohio	4,578	13	12	65	1,667	2,834	
Wisconsin	3,004	7	163	190	779	1,872	
Total	12,191	24	270	493	5,775	5,653	
1913.							
California	662	....	24	36	419	183	10 months, March to December.
Maryland (exclusive of Baltimore)	103	....	....	6	97	....	Except May and July.
Massachusetts	152	....	23	16	76	37	Except July.
Michigan	1,478	....	15	55	1,114	294	
Minnesota	2,861	....	47	201	2,255	358	
New York	737	....	22	94	432	189	Except June.
Ohio	1,782	....	10	21	763	988	Except February, March, April, and May.
Vermont	34	....	....	1	9	24	January only.
Wisconsin	2,054	....	160	195	520	1,179	
1912.							
Massachusetts	37	....	1	1	23	12	October, November, December.
Minnesota	1,066	....	25	76	775	190	7 months, June to December.
Montana	20	....	....	....	4	16	November only.
New York	372	....	....	29	204	139	October, November, December.

TRICHINIASIS.

Between December 1 and 8, 1915, 10 cases of trichiniasis, with 3 deaths, were reported in Portland, Oreg. All of the cases were in Italians who had eaten infected sausage, samples of which upon examination were found to contain large numbers of encisted larvæ.

TUBERCULOSIS.

The information which city and State health departments are securing of the prevalence of tuberculosis is improving. Cases are being reported more frequently so that the health department's information of where the sick are and the conditions under which they are living is constantly becoming more complete.

During the calendar year 1915 the highest recorded case rate in the continental United States was in New York State, where 3.2 cases were recorded for each 1,000 of the population. Hawaii had 3.5 cases reported for each 1,000 population, and Mississippi 4.2. In the latter State, however, the means of collecting the information is not sufficiently accurate to warrant comparison with other States. Many of the cases undoubtedly are reported several times.

Of the larger cities, Newark, N. J., Chicago, Ill., and Los Angeles, Cal., reported the highest number of cases in proportion to the population. Newark recorded 5.4 per 1,000 population, Chicago 5.2, and Los Angeles 5.1. It is not to be assumed that Newark and Chicago have a greater proportion of tuberculous persons than many other cities. The probable explanation is that the health departments have been especially interested in the disease and have secured the cooperation of practicing physicians in the reporting of cases. Los Angeles probably has a relatively large number of such persons, as many go there from other States in the hope of regaining their health.

Tuberculosis.—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Cases reported.	Deaths registered.	Case rate per 1,000.	Cases reported for each death.	Cases reported.	Deaths registered.	Case rate per 1,000.[1]	Cases reported for each death.
Alabama	2,301,277	1,341	2,341	....	....	....	....	....	....
Arizona	247,299	122	414	....	....	....	....	....	....
California	2,848,275	6,213	5,551	2.181	1.12	[2] 5,685	5,292	2.061	1.07
Connecticut	1,223,583	2,015	1,471	1.647	1.37	1,885	1,496	1.567	1.26
District of Columbia	358,678	1,095	734	3.053	1.49	1,057	715	2.991	1.48
Hawaii	231,210	808	388	3.495	2.08	699	371	1.783	1.88
Indiana	2,798,142	[2] 2,376	3,926	....	....	[2] 3,922	1,796	1.411	2.18
Kansas	1,807,221	1,303	972	.721	1.34	1,080	1,005	.605	1.01
Louisiana	1,801,306	142	(3)	.079	....	1,673	1,106	.943	1.51
Maryland[4]	1,351,941	3,215	(3)	2.378	....	3,438	1,365	1.013	2.52
Michigan	3,015,442	3,848	2,822	1.276	1.36	2,566	2,679	....	....
Minnesota	2,246,761	[2] 4,622	2,231	2.057	2.07	3,045	2,295	1.375	1.33
Mississippi	1,926,778	8,089	(3)	4.198	....	7,897	2,479	4.152	3.18
Montana	446,054	....	....	....	....	236	399	....	....
Nevada	102,730	168	49	1.635	3.43	....	....	....	....
New Jersey	2,881,840	8,612	4,377	2.988	1.97	8,467	4,330	3.007	1.95
New York	10,086,568	32,743	16,309	3.246	2.01	[2] 31,073	16,438	3.139	1.89
Ohio	5,088,627	6,624	(3)	1.302	....	[2] 5,685	(3)	1.131	....
Oklahoma	2,114,307	593	405	.280	1.46	....	....	....	....
Oregon	809,490	437	684	....	....	419	622	....	....
Philippine Islands	8,650,937	....	....	....	....	[2] 7,797	19,236	....	....
Porto Rico	1,184,489	1,720	2,107	....	....	1,664	1,664	....	....
Rhode Island	602,765	....	....	....	....	801	934	....	....
South Carolina	1,607,745	393	1,985	....	....	384	(3)	.242	....
South Dakota	680,046	....	....	....	....	57	289	....	....
Texas	4,343,710	512	3,146	....	....	....	....	....	....
Utah	424,300	131	155	....	....	148	164	....	....
Vermont	362,452	288	251	.795	1.15	297	280	.822	1.06
Virginia	2,171,014	5,005	(3)	2.305	....	4,421	3,551	2.056	1.24
Washington	1,471,043	[2] 1,749	1,238	1.189	1.41	[2] 1,601	1,210	1.137	1.32
West Virginia	1,359,474	332	65	.244	5.11	....	....	....	....
Wisconsin	2,473,533	1,766	2,286	....	....	1,765	2,319	....	....

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.

[2] The health officer states that cases are known not to be completely reported.

[3] Deaths were not reported.

[4] Maryland figures for 1914 are exclusive of Baltimore City.

TYPHOID FEVER.

Typhoid fever, while one of the infections which is to be found in practically all sections of the country, is undoubtedly becoming less and less prevalent owing to the more general knowledge regarding the means by which it is spread and the improvement in municipal and individual water supplies, supervision of the handling of milk, and the screening of houses.

The highest recorded case rates in States during the calendar year 1915 were in Mississippi, Maryland, and Virginia, where rates of 3.2 per 1,000 population, 2.4, and 2, respectively, were reported. Of these States, however, the methods employed by Maryland are the only ones which are sufficiently accurate to make the results available for comparison with other States.

As indicating the excellence of the reports of cases being received, the fatality rates in Utah and the District of Columbia are of special interest. In Utah this rate was 10.5, in the District of Columbia 11.7 per 100 cases, showing practically 10 reported cases for each registered death.

Of the larger cities the highest recorded case rates were in Nashville, Tenn., Birmingham, Ala., and Toledo, Ohio, with rates of 3.6, 2.4, and 2.3, respectively, per 1,000 population.

The lowest fatality rates of the larger cities, which usually may be taken as an index of the completeness of the reported cases, were recorded in Lynn, Mass., with a rate of 4.9 per 100 cases, in Salt Lake City, Utah, with a rate of 6.7, and Hartford, Conn., with one of 8.9.

Typhoid fever—Cases reported, and case and fatality rates, in States in which the prevalence of the disease is recorded, 1914 and 1915.

	Estimated population July 1, 1915.	1915				1914			
		Cases reported.	Deaths registered.	Case rate per 1,000.	Fatality per cent.	Cases reported.	Deaths registered.	Case rate per 1,000.[1]	Fatality per cent.
Alabama	2,301,277	2,019	674	0.877	[2] 33.38	....	....	....	....
Arizona	247,299	[3] 105	41	.425	[2] 39.05	....	....	....	....
California	2,848,275	1,126	276	.395	[2] 24.51	1,810	376	0.656	[2] 20.77
Connecticut	1,223,583	981	146	.802	14.88	734	108	.610	14.71
District of Columbia	358,679	359	42	1.015	11.70	340	45	.962	13.24
Hawaii	231,210	117	29	.506	[2] 24.79	199	49	.956	[2] 24.62
Illinois	6,069,519	....	....	....	....	3,954	630	.660	[2] 15.93
Indiana	2,798,142	[3] 1,718	413	.614	[2] 24.04	[3] 2,500	568	.899	[2] 22.72
Kansas	1,807,221	1,316	194	.728	14.74	1,693	339	.949	[2] 20.02
Louisiana	1,801,306	518	(4)	.288	....	524	83	.295	[2] 15.83
Maryland [5]	1,351,941	3,198	(4)	2.365	....	1,860	197	1.387	10.59
Michigan	3,015,442	1,730	331	.574	[2] 19.13	1,943	378	.653	[2] 19.45
Minnesota	2,246,761	[3] 1,010	148	.450	14.65	1,784	217	.806	12.16
Mississippi	1,926,778	6,158	(4)	3.196	....	6,179	624	3.249	10.10
Montana	446,054	....	....	....	....	501	61	1.158	12.18
Nevada	102,730	129	17	1.256	13.18	....	....	....	....
New Jersey	2,881,840	1,453	188	.504	12.94	1,564	223	.555	14.26
New York	10,086,568	5,484	750	.544	13.68	5,481	867	.554	[2] 15.82
Ohio	5,088,627	4,501	(4)	.885	....	4,796	(4)	.954	....
Oklahoma	2,114,307	1,381	189	.653	13.69	....	....	....	....
Oregon	809,490	189	55	.233	[2] 29.10	227	60	.290	[2] 26.43
Philippine Islands	8,650,937	....	....	....	....	251	2,070	....	....
Porto Rico	1,184,489	448	109	.378	[2] 24.33	383	133	.323	[2] 34.17
Rhode Island	602,765	....	....	....	....	405	58	.685	14.32
South Carolina	1,607,745	1,144	522	.712	[2] 45.63	1,317	(4)	.828	....
South Dakota	680,046	....	....	....	....	142	42	.215	[2] 29.58
Texas	4,343,710	1,038	628	.239	[2] 60.50	....	....	....	....
Utah	424,300	373	39	.879	10.46	668	65	1.612	9.73
Vermont	362,452	329	43	.908	13.07	275	44	.761	[2] 16.00
Virginia	2,171,014	4,419	(4)	2.035	....	3,924	484	1.825	12.33
Washington	1,471,043	818	121	.556	14.79	[3] 733	149	.521	[2] 20.33
West Virginia	1,359,474	504	23	.371	4.56	....	....	....	....
Wisconsin	2,473,533	400	98	.162	[2] 24.50	553	134	.226	[2] 24.24
Wyoming	174,148	57	8	.327	14.04	49	13	.290	[2] 26.53

[1] The computations of case rates for 1914 were made on the basis of estimated population July 1, 1914.
[2] A fatality rate as high as this indicates that the cases have not been completely reported.
[3] The health officer states that cases are known not to be completely reported.
[4] Deaths were not reported.
[5] Maryland figures for 1914 are exclusive of Baltimore city.

TYPHUS FEVER.

Since the demonstration that the so-called "Brills Disease," of which cases had been recognized in New York City for a number of years. was in reality typhus fever, cases have from time to time been recognized in cities throughout the country. During the past year, owing to the prevalence of typhus fever in Mexico and the increased travel back and forth across the Mexican border, a number of cases of the disease have been reported in Texas, Arizona, and New Mexico. The cases reported to the Public Health Service are shown in the appended table.

Place.	Period covered.	Cases reported.
Arizona:		
Florence	July 18, 1916	3
Morenci	Month of May, 1916	10
Seligman	July 18, 1916	2
California:		
Los Angeles	do	1
Mullpark	Month of June, 1916	1
Maryland:		
Baltimore	June 28 to Sept. 18, 1915	3
New Mexico:		
Malpais	Apr. 20, 1916	1
Santa Rita	Mar. 13 to Apr. 11, 1916	4
New York:		
New York City	Aug. 29, 1915, to Jan. 29, 1916	5
Tennessee:		
Memphis	Aug. 6, 1915	1
Texas:		
Brownsville	July 11, 1916	1
Conejo	June 8, 1916 (total to date, 4)	1
Eagle Pass	Month of February, 1916	1
El Paso	Jan. 1 to July 20, 1916	42
Galveston	Week ended June 10, 1916	1
Hurley	Apr. 9, 1916	1
Laredo	Dec. 1, 1915, to June 13, 1916	17
Pearsall	May 19, 1916	1

WORLD PREVALENCE OF CHOLERA, PLAGUE, TYPHUS FEVER, AND YELLOW FEVER.

These diseases are probably much more prevalent than the reported cases would indicate. They are doubtless present in many localities in atypical or mild form and not recognized. In many localities plague is undoubtedly present continuously in rats and only periodically attacks man. Cholera may be carried over from season to season in unrecognized form. This has been shown to be true in Manila and elsewhere. The same is without question true of typhus fever. In the United States cases of typhus fever are occasionally recognized in all of the larger cities and "Brills disease" was recognized for years before its identity with typhus fever was more than suspected. Mild and atypical forms of the disease probably occur in all of the larger cities of Europe and Asia, and probably also of Africa and South America. Yellow fever occurs in endemic centers much more frequently than the reported cases would indicate. In these localities it is probably a disease of childhood and appears usually as a rather mild affection.

CHOLERA.

EUROPE.

Cholera was present in Austria-Hungary from August 7 to October 31, 1915, with 22,838 reported cases, and from January 3 to

May 6, 1916, with 425 reported cases. A few cases occurred at Vienna, and at Trieste 80 cases were notified as occurring during an outbreak which terminated in October, 1915. The disease appears to have occurred mainly in connection with the operations in the scene of war, many outbreaks having been reported among troops and in camps for the detention of prisoners of war, but it had an extensive prevalence among the civilian population, chiefly in Hungary and the Province of Galicia.

The history of cholera in Austria-Hungary shows that the disease was introduced during the wars of 1854–1856 and 1866 and again during the Balkan war[1] by returning soldiers arriving from or having traversed countries in which cholera was present. During the present period the infection appears to have been reintroduced.

In Germany cholera was present from July to October, 1915, mainly among troops and in prison camps. The greatest prevalence was reported in camps in the government district of Marienwerder, with 605 cases. A few cases occurred among civilians. In Greece cholera was reported at Corfu during March, 1916. In Italy 3 cases were notified at Venice and 1 case at Leghorn during August, 1915. In Russia cholera was present at Kherson, Odessa, and Theodosia in August, 1915, and in Archangel in October, 1915. At Moscow 240 cases of cholera were notified from August 29 to October 9, 1915. In Serbia cholera was present in July, 1915. In Turkey in Europe cholera was reported present from May 24 to June 13, 1915, with 53 cases.

There were probably many more cases of cholera in Europe, but the reports did not reach the Public Health Service owing to the disturbed conditions in many localities abroad.

ASIA.

Cholera continued present in Asia. In China 5 cases were notified at Hongkong in October, 1915. In India it was present in the cities of Bombay, Calcutta, Karachi, and Madras, but with an inconsiderable number of cases, except in Calcutta, where 453 fatal cases were notified to December 31, 1915, and from January 2 to May 27, 1916, 193 fatal cases. In Burma cholera was reported present in the principal towns, the greatest prevalence being in Rangoon, with 1,021 reported cases. In Indo-China from December 1 to 31, 1915, there were notified 510 cases, with 395 deaths, and from January 1 to February 29, 1916, 1,332 cases, with 762 deaths, of which 1,788 cases, with 1,126 deaths, occurred in the Province of Anam. In Persia cholera was present in August and September, 1915, with 175 cases reported at Tabriz. It was also present in Persia in November, 1915, and recurred in February, April, and May, 1916, being declared epidemic at Recht April 1, 1916. At Asterabad it was present, with 5 deaths estimated as occurring daily during June, at Foumen in May, and at Ghazian and Mohammerah in June, 1916. In Siam cholera was present in Bangkok in September, 1915, and from January 9 to May 27, 1916, with 16 cases. In the Straits Settlements it was present in September, 1915, and again in the spring of 1916. In

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[1] The Balkan troops became infected suddenly in the vicinity of Constantinople during the second week of November, 1912, with 17,000 cases to November 18 and 30,000 to November 30, 1912.

Turkey in Asia cholera was reported present at Trebizond in December, 1915, and January, 1916.

From May 1 to June 18, 1916, 2,790 cases were reported as occurring in Turkey in Asia, being distributed in 72 localities, including Aleppo, with 92 cases; Bagdad, with 18; Jaffa, with 56; Smyrna, with 128; and Tripoli in Syria, with 173 cases. As regards the Asiatic islands cholera was reported as follows: Borneo, epidemic at Bandjermasin, capital of Dutch Borneo, in August, 1915, and at about the same period at Sandakan, capital of British Borneo, and at a few other localities. An outbreak occurred in a jail at Sandakan. In the island of Java cholera was present from September 1 to December 6, 1915, with 365 cases, and from March 4 to April 12, 1916, with 8 cases. On September 3, 1915, the disease was declared epidemic at Batavia. On the island of Sumatra cholera was present in June, 1915, with a considerable number of cases.

In the Philippine Islands 4 cases of cholera were notified at Manila during the period from July to December, 1915, and from January 2 to July 1, 1916, 83 cases. Cholera was present in the Province of Culion in April, 1916. From May 21 to July 1, 1916, 340 cases were notified, in the Provinces of Bulacan, Cagayan, Camarines, Cavite, Lanao, Laguna, Mindoro, Rizal, Romblon, and Tayabas.

AFRICA.

In Africa the only occurrence of cholera was in Egypt, in connection with the steamship *Pei-ho*, at Suez, and at Tor quarantine station. At Suez from May 18 to 20, 1916, 5 cases were reported removed from the vessel, and from May 22 to June 3, 1916, at Tor 112 cases occurred among passengers isolated from the *Pei-ho.*

AT SEA.

Two outbreaks of cholera occurred on vessels sailing from ports in Indo-China to Marseille, France, each carrying a large number of laborers from the Province of Anam in Indo-China. In both cases the infection originated in the group of laborers from Anam. The first outbreak occurred on the steamship *Pei-ho*, which left Saigon April 19, 1916, and arrived at Colombo, Ceylon, April 30, and there disembarked the body of one of the group of Anamites who had died of cholera en route. After leaving Colombo 8 cases developed on the *Pei-ho* in the same group. On arrival at Suez 5 cases were found on board, and the vessel was sent to the quarantine station of Tor, where from May 22 to June 3, 1916, inclusive, 112 cases developed among passengers isolated in quarantine; 44 carriers were identified.

The second cholera outbreak at sea occurred on the steamship *Hong-Kheng* from Haifong, Indo-China, which sailed from that port April 27, 1916, and arrived at Colombo May 6 with 3 cases of cholera on board and a history of 17 cases occurring en route. During the stay of the *Hong-Kheng* at Colombo 38 cases of cholera were landed from the vessel, and 3 cases terminated fatally on board. From May 17 to the departure of the vessel for Suez, June 1, 1916, 23 cases of cholera developed among contacts isolated on shore.

PLAGUE.

Plague being primarily a disease of rodents and only secondarily a disease of man, it is apparent that, as plague in the past has been recognized to be present only when it attacked man, it has frequently existed in localities without its presence being known. The presence of the disease in rodents is of far more significance than its presence in man; and the history of the disease in a community must be primarily that of its presence in the rodents of the community, plague being present when it exists in rats just as truly as when it exists in man. In fact, a plague-infected rat is a greater menace to the community than is a plague-infected man.

The number of plague-infected rats found varies with the number of existing plague-infected rats and also with the amount of trapping which is done and the thoroughness with which it is done. Plague-infected rats may be present, but if the trapping is not done properly, few if any will be caught.

PLAGUE IN RODENTS.

Rat destruction and examination of rodents for plague infection have been carried out at many ports, but detailed reports of the actual numbers of rats examined are available in only a few cases. As the great importance of the detection of plague in rodents becomes more widely recognized the systematic examination of rats may be expected to become a regular measure of public sanitation, especially at points where importation of plague from the endemic areas of the disease in the Orient is a constantly present menace.

In Australia examination of rats has been systematically carried out at all the ports of the Commonwealth. In Chile rat destruction was initiated at the beginning of May, 1916, with a total to June 24 of 6,545 rats destroyed.

In China rat examination was reported at Hongkong and Shanghai. At Hongkong during the period from July 1 to December 31, 1915, 54,796 rats were reported examined, with 49 rats found plague infected, and from January 2 to June 17, 1916, 4,184 rats reported examined with 5 found infected, the last plague rats, 2 in number, being reported found during the week ended June 17, 1916.

At Shanghai for the last six months of the year 1915, 6,308 rats were examined with 1 rat found infected, and from January to June, 1916, 7,011 rats with 6 rats found plague infected, the last plague rat at Shanghai having been reported found during the week ended May 6, 1916.

At Liverpool, England, rat examination continued to be carried out, with a total from September 11, 1915, to July 1, 1916, of 8.608 rats examined. The rats taken included those found in warehouses and stores, in sewers, and on ships and quays.

At Zanzibar rat examination continued to be reported at the port of Zanzibar, with a total from July to December, 1915, of 22,439 rats examined, and from January to March, 1916, inclusive, of 14,095 rats examined.

At Buenos Aires, Argentina, in addition to the collection and destruction of rats on land and the deratization of ships in the harbor, deratization was carried on for river craft of every class plying on the great inland waterway of the Uruguay River.

In the Territory of Hawaii the work of rodent destruction and examination was systematically carried out, with a weekly average of about 400 rats and mongoose examined at Honolulu and about

2,000 rats and mongoose examined at Hilo. In Porto Rico rats, mice, and mongoose were collected and examined weekly at San Juan and the suburban towns of Puerta de Tierra and Santurce.

At Manila, P. I., during the period July-December, 1915, 43,794 rats were reported destroyed.

PLAGUE IN MAN.

Europe.—In Europe plague in man was reported only in Greece. In December, 1915, a fatal case occurred at Athens, and in January, 1916, seven cases were notified at Piræus, the seaport of Athens. Plague was also present in the Grecian Islands. At Zante, in the Ionian Sea, 15 miles west of the mainland, 14 cases were notified from August to October, 1915, and the disease was still present October 23. In the Grecian Archipelago, east of the mainland, 16 cases were notified in January on Syra Island, and in June, 1916, the disease was present on the island of Mitylene.

Asia.—The greatest diffusion of plague continued to be in Asia. The countries affected were China, the Dutch East Indies, India, Indo-China, Japan, Persia, Siam, Straits Settlements, and Turkey in Asia. In China the disease was present at Amoy in August, 1915, at Hongkong in October and November, and at Shanghai in October, with 1 fatal case. At Hongkong from January 2 to June 17, 1916, 16 cases were notified.

In India plague was continuously present, with a total from October 31, 1915, to January 1, 1916, of 40,533 reported cases, and from January 2 to May 13, 1916, of 142,058 cases. In cities plague was reported as follows: Bombay, January 2 to June 3, 1916, 1,975 cases; Calcutta, January 2 to June 3, 1916, 67 cases; Karachi, March 25 to June 17, 1916, 109 cases; Madras City, 1 case during the first week in January, 1916. In Madras Presidency from January 9 to June 17, 1916, 6,953 cases were notified. In the cities in the Province of Burma the greatest prevalence was in Rangoon, with 1,255 cases from October, 1915, to June 3, 1916. Of the remaining Burmese cities in which fatal plague cases only were notified, Mandalay showed 1,414 cases from October, 1915, to June 3, 1916; the remaining cities, nine in number, aggregated for the same period about 445 cases.

In Indo-China plague was present in the Provinces of Anam, Cambodia, Cochin-China, and Tonkin, as follows: September, 1915, 72 cases; December, 1915, 90 cases; and during January and February, 1916, 205 cases. During May and June, 1916, it was present at Saigon, the capital, with 39 cases.

In the island of Java, Dutch East Indies, plague was reported present during the calendar year 1915, with a total of 1,689 cases, and from January 1 to April 7, 1916, with 961 cases. The disease was confined mainly to the Provinces of Kediri, Madioen, Pasoeroean, Surabaya, and Surakarta, situated in East Java.

In Japan plague was present in July, 1915, in the island of Taiwan (Formosa) and at Tokyo in August, 1915.

In Persia the disease was present at Mohammerah, on the frontier of Asiatic Turkey, in June, 1916; and at Recht in May, 1916, with 20 cases. In Siam plague was present at Bangkok during August and November, 1915, and from January 2 to June 17, 1916, with 391 reported cases. In the Straits Settlements plague was present at Penang in November and December, 1915; at Singapore in October and December, 1915, and from February 20 to May 20, 1916, with an inconsiderable number of reported cases. In Turkey in Asia plague was reported present at Bagdad in July, 1915, with 12 cases, and on the island of Chios, in the Ægean Sea, plague was reported present in August, 1915.

Africa.—Plague continued present in Egypt with a marked increase in prevalence. For the calendar year 1915 there were notified 285 cases. From January 1 to June 30, 1916, 1,642 cases were notified, as against 173 in the corresponding period of 1915. Of these 38 occurred at Alexandria, 22 at Port Said, and 1 at Suez. The remaining cases were distributed in 11 provinces, the greatest prevalence being in the Province of Fayoum, with 707 cases. A case of plague was landed at Suez from the steamship *Syria* from Bombay January 10, 1916. In Morocco plague was reported present at Arzila September 4, 1915. In the Union of South Africa 36 cases of plague were notified in the Orange Free State from January 23 to March 19, 1916.

Azores.—Plague was present on the island of Terceira in July, 1915.

Hawaii.—In Hawaii plague was present at Honokaa and Paahau in December, 1915, with 1 case each; at Paauilo Camp in October, 1915, with 1 case; and at Kukaiau in November, 1915, with 1 case.

Mauritius.—Plague was present in September, 1915; in October and December, 1915, there were 8 cases; and from January 10 to April 15, 1916, 8 cases.

South America.—In South America plague was reported present in Argentina, Brazil, Chile, Ecuador, and Peru. In Argentina 1 case was notified at Buenos Aires in September, 1915, and from December 19, 1915, to January 22, 1916, the disease was reported present in 10 localities of the interior province of Cordoba, with 49 cases. In Brazil plague was present at Bahia with 3 cases in July, 1915, and from August 8, 1915, to January 1, 1916, with 24 cases. From January 16 to 22, 1916, 4 cases were reported. In Rio de Janeiro 5 cases were notified during August, 1915. In Chile plague was reported at Antofagasta from January 1 to June 3, 1916, with 13 cases; at Tacna during the month of April, 1916, with 8 cases; and at Mejillones in May and June, 1916, with 3 cases. In Ecuador 234 cases were notified at Guayaquil during the two months of November and December, 1915, and 539 cases from January to April, 1916, inclusive. At Duran plague was present in December, 1915, with 1 case, and from January to April, 1916, inclusive, with 5 cases. At Babahoyo 1 case was notified in February, 1916. During the months of May and June, 1916, 10 cases were notified at Guayaquil. The disease also ascended the Andes and appeared in epidemic form at Ambato, a town situated at an altitude of 7,000 feet. It was also present in the country districts back of the coast towns of Bahia and Manta. Four cases were notified during June, 1916, at Daule, a town situated on the river Daule and 22 miles distant from Guayaquil. In Peru the cases of plague reported during the calendar year 1915 numbered 455. These were distributed in 8 maritime provinces and in the interior province of Junin.

At sea.—Four cases of plague occurred at sea on the steamship *Syria* from Bombay during the period from December 29, 1915, to January 10, 1916. Of these cases 3 were left at Aden, Arabia, and 1 was left at Suez, Egypt.

TYPHUS FEVER.

EUROPE.

Typhus fever continued present in Austria-Hungary, the area of greatest prevalence of the disease being Austria, and more particularly the province of Galicia. During the months of July, August, and September, 1915, 2,396 cases were notified in Austria; from November 14 to December 31, 1915, 490 cases; and from January 9 to February 26, 1916, 2,425 cases. From April 22 to May 20, 1916, 1,311 cases were notified in Galicia, and 251 cases in other provinces of Austria. The disease was present in Bosnia-Herzegovina, Croatia-Slavonia, and Hungary, but with an inconsiderable number of reported cases.

A marked increase in typhus fever in Austria-Hungary had been observed from the beginning of the year 1915. From August 1 to December 31, 1914, only 279 cases were reported, while from January 1 to April 24, 1915, the number of cases reported was 1,212. As in the case of cholera the prevalence of typhus was mainly in connection with the military occupation of the country. A large diffusion occurred among the civilian population. In France 1 fatal case of typhus was reported at La Rochelle in July, 1915, and 1 at Havre in May, 1916. In Germany the occurrence was mainly among troops and military prisoners, the greatest prevalence being reported from the govenment distict of Königsberg and the Kingdom of Saxony. During the month of July, 1915, 46 cases were reported and from August 22 to October 23, 1915, 30 cases. From February 6 to March 4, 1916, 112 cases were reported as occurring among military prisoners and from April 23 to May 30, 1916, 25 cases. Cases were reported from a number of cities including Aix la Chapelle, Berlin, Bremen, Breslau, Hamburg, Hanover, and Lubeck. At Berlin 42 cases were notified from September 5, 1915, to January 1, 1916, and from January 2 to May 30, 19 cases.

In Great Britain typhus fever was reported present in 9 cities, viz, Cardiff, Cork, Dublin, Dundee, Glasgow, Liverpool, Manchester, Newcastle, and Southampton, the cases occurring as follows: Cardiff, April 23 to 29, 1916, 1 case; Cork, August 22 to 28, 1915, 1 case; Dublin, July 4 to November 20, 1915, 4 cases; Dundee, December 12 to 18, 1915, 3 cases; Glasgow, August 4 to November 6, 1915, 4 cases; and February 11 to March 1, 1916, 1 case; Liverpool, October 16 to December 25, 1915, 16 cases; March 5 to 11, 1916, 1 case; Manchester, January 23 to 29, 1916, 5 cases; Newcastle, June 25 to July 3, 1915, 1 case; Southampton, May 7 to 13, 1916, 1 case.

In Greece typhus was reported at Athens in July, 1915. At Saloniki, during the summer and fall of 1915, 253 fatal cases were notified and from October 24, 1915, to June 11, 1916, 221 cases. In December typhus was present at Yehidji-Vardar among troops.

In Italy 3 cases were reported at Palermo in December, 1915, and 3 cases in January, 1916.

In Russia typhus was present in October, 1915, at Moscow, Petrograd, and Riga. At Warsaw 800 cases occurring among refugees were reported in December, 1915. From January 2 to June 17, 1916, 2,106 cases were notified at Moscow and from January 2 to May 27, 1916, 86 cases at Petrograd.

In Spain typhus was present at Madrid in August, 1915, and again in November, 1915, and February, 1916, with 1 fatal case in each of the months named.

In Switzerland typhus was present in September, 1915, and May, 1916, at St. Gall; at Geneva in October, 1915; and at Zurich in October, 1915, and January, 1916.

ASIA.

In Asia typhus was reported in China, Japan, Java, Siberia, and Turkey in Asia. In China it was present at Antung in October, November, and December, 1915, and from March 13 to May 1, 1916; at Hankow, Harbin, and Mukden in July, 1915; at Chefoo in April, 1916; and at Tientsin in July, 1915, and from March 19 to April 29, 1916. The number of cases notified was inconsiderable. In Japan typhus was present at Tokyo September 3, 1915. At the beginning of the year 1916 an outbreak of the disease occurred at Tokyo and from January 1 to June 8, 1916, 417 cases were notified at that place. At Hakodate the disease was present from August to October, 1915, and at Nagasaki in October. In the island of Java, Dutch East Indies, from October 15 to December 30, 1915, 42 cases were notified and from January 3 to May 17, 1916, 228 cases. These cases were distributed in East, Mid-Java, and West Java. At Batavia, the capital of Java, situated in the eastern part of the island, from October 26, 1915, to May 17, 1916, 146 cases were notified. The disease was present at Samarang in September, October, and December, 1915, and from January 1 to April 28, 1916, 37 cases were notified. At Surabaya 6 cases were notified from April 8 to May 12, 1916. In Siberia, Russian Asia, at Vladivostok, 21 cases occurred from October 8 to November 13, 1915. In Turkey in Asia typhus was reported present at Adana in July, 1915, and in March and April, 1916; at Beirut in September, 1915, and with 20 cases from January 23 to February 12, 1916. At Aleppo the estimated number of cases occurring daily in October and November was 200; at Damascus 1,100 cases were reported among troops in February, 1916. Cases were reported from November, 1915, to May, 1916, at Mersina and Tarsus and at Haifa and Jaffa in April, 1916.

AFRICA.

In Africa typhus was reported present only in Algeria and Egypt. At Algiers 2 cases were notified from February 1 to April 30, 1916. In Egypt the disease was reported present during the last quarter of 1915 at Alexandria, Cairo, and Port Said. From January 1 to June 17, 1916, 423 cases were notified at Alexandria; from January 1 to February 11, 1916, 46 cases at Cairo; and at Port Said 1 case occurred in January, 1916.

CANADA.

A fatal case of typhus fever was notified at Kingston, Ontario, in August.

MEXICO.

In Mexico typhus was reported at Aguascalientes, Mexico City, Oaxaca, Puebla, Salina Cruz, Tampico, and Vera Cruz during the last quarter of 1915. From January 3 to June 10, 1916, it was present in Guadalajara, Hermosillo, Juarez, Monterey, Nogales, Nuevo Laredo, and Salina Cruz, with 235 cases; at Saltillo with 20 deaths, Tampico with 12 deaths, and Vera Cruz with 8 deaths, and at Aguascalientes with 164 deaths, and in the City of Mexico, from January 1 to 31, 1916, with 2,001 cases, of which 488 were fatal. It was also reported present at Guayamas in May and at Queretaro in December, 1915, with 500 cases.

CUBA AND THE WEST INDIES.

In Cuba two cases were reported at Habana in February, 1916, as having been imported from Mexico. In the Canary Islands typhus was present at Santa Cruz de Teneriffe in September, 1915, and from March 19 to April 8, 1916, with two cases. In the island of Curaçao four cases were reported in August, 1915. In the Dominican Republic, at Santo Domingo, from July 19 to August 31, 1915, two cases were reported.

In the Azores Islands, at Terceira, typhus was reported present in July, 1915.

YELLOW FEVER.

CENTRAL AMERICA.

In Panama from September 27 to December 10, 1915, four cases of yellow fever were reported at Balboa quarantine station, Canal Zone, in persons arrived from Buenaventura, Colombia.

MEXICO.

In Mexico one fatal case was notified at Frontera April 20, 1916.

SOUTH AMERICA.

In South America yellow fever occurred in Brazil and Ecuador. In Brazil one fatal case was notified at Bahia during the week ended July 17, 1915. In Ecuador the disease was reported at Guayaquil in November, 1915, with 14 cases and from January 1 to April 30, 1916, with 66 cases; at Duran with 1 case in April, 1916; at Milagro with 1 case in December, 1915; and 5 cases from January 1 to April 30, 1916.

SANITARY LEGISLATION.

The publication of court decisions, laws, ordinances, and regulations pertaining to public health was continued during the fiscal year 1916. As soon as the decisions and enactments are available they are published in the Public Health Reports, and later they are rearranged, indexed, digests of the court decisions are prepared, and the matter is reprinted in annual volumes in convenient form for the use of public health officers and sanitarians. Many requests are received from public health officers and other persons interested in sanitary work for copies of laws or ordinances which have proved effective in meeting certain conditions. Such requests are complied with whenever possible.

SUMMARY OF STATE HEALTH LAWS AND REGULATIONS, 1915–16.

Copies of State laws and regulations pertaining to public health are secured through the health officers of the States as soon as possible after enactment and are published currently in the Public Health Reports. When the session laws of the various States are received by the Library of Congress the volumes are examined and all public health laws which have not already been secured are published.

Reprints from the Public Health Reports Nos. 200, 264, 279, and 338 are compilations of these States laws and regulations. They contain the measures adopted from July 1, 1911, to December 31, 1915. The last volume, Reprint 338, contains the public health laws and regulations adopted during the calendar year 1915.

The following is a summary of some of the more important public health measures adopted during the year ended June 30, 1916:

MORBIDITY REPORTS.

Alaska.—The commissioner of health of Alaska promulgated comprehensive rules requiring the reporting of cases of preventable diseases to local health officers and providing for monthly reports by local health officers to the assistant health commissioners who are in charge of the health divisions into which the territory is divided. (Public Health Reports, May 12, 1916, p. 1208.)

California.—The regulations requiring the reporting of cases of tuberculosis were revised (Public Health Reports, June 30, 1916, p. 1726), and malaria was added to the list of notifiable diseases. (Public Health Reports, Feb. 18, 1916, p. 398.)

Indiana.—The State Board of Health of Indiana revised the rules requiring reporting of cases of communicable diseases. (Public Health Reports, Apr. 21, 1916, p. 1026.)

Illinois.—In Illinois cerebrospinal meningitis and mumps were made notifiable. (Public Health Reports, June 30, 1916, pp. 1728–1730.)

Kansas.—The State Board of Health of Kansas, by regulation, required the reporting to the local health officer and by him to the State board of health of every person "who is known to harbor the bacilli, virus, or infective agent of any communicable disease." This, if enforced, will enable measures to be taken to protect the community from "carriers" of disease. (Public Health Reports, June 30, 1916, p. 1733.)

Maine.—The regulations governing the notification of cases of preventable diseases in the State of Maine were revised by the State board of health. In order to secure prompt reports physicians are required to use the telephone when practicable. (Public Health Reports, July 7, 1916, p. 1801.)

Massachusetts.—The Massachusetts Legislature amended the law requiring reports of cases of communicable diseases by local boards of health to the State department of health. Such reports must be made within 24 hours after the local health authorities receive notice of a case. (Public Health Reports, June 30, 1916, p. 1736.)

Michigan.—The State Board of Health of Michigan revised the State regulations requiring the reporting of cases of communicable diseases. (Public Health Reports, Oct. 8, 1915, p. 3045.)

Minnesota.—A regulation of the State Board of Health of Minnesota makes it the duty of the person in charge of any dairy or place where milk, milk products, or foodstuffs which are liable to be eaten without being cooked, are produced or handled, to report all cases of communicable disease on the premises or coming in contact with the products. (Public Health Reports, June 30, 1916, p. 1742.)

New Hampshire.—Ophthalmia neonatorum was added to the list of notifiable diseases in the State of New Hampshire. (Public Health Reports, June 30, 1916, p. 1742.)

New York.—The New York Public Health Council adopted a special regulation governing the reporting of cases of communicable disease on any dairy or any farm producing milk or milk products for sale. Local health officers receiving such reports are required to notify the state commissioner of health by telephone or telegraph. (Public Health Reports, Feb. 11, 1916, p. 342.)

The New York law requiring the reporting of cases of tuberculosis was amended so as to require officers in charge of hospitals or other institutions to report to the State commissioner of health all cases of tuberculosis coming from outside the state. (Public Health Reports, July 7, 1916, p. 1807.)

Regulations were promulgated by the commissioner of health and the commissioner of education of the State of New York requiring prompt notice to local health officers of cases of communicable diseases in schools. (Public Health Reports, July 7, 1916, p. 1809.)

Ohio.—The Ohio State Board of Health adopted regulations intended to make more effective the State law which requires notification of cases of ophthalmia neonatorum. (Public Health Reports, Mar. 24, 1916, p. 796.)

Vermont.—A regulation of the State Board of Health of Vermont required the immediate reporting to the local health officer of the arrival of children from Greater New York. This regulation was intended to prevent the introduction into the State of poliomyelitis. (Public Health Reports, July 14, 1916, p. 1879.)

Virginia.—The State Board of Health of Virginia adopted regulations to carry out the provisions of the law requiring reporting of cases of sickness. (Public Health Reports, July 28, 1916, p. 2034.)

West Virginia.—The public health council of West Virginia adopted comprehensive regulations requiring the reporting of cases of communicable diseases. These regulations embodied many of the desirable features of the model statute law for morbidity reports. (Public Health Reports, July 14, 1916, p. 1880.)

Wisconsin.—The Wisconsin Legislature amended the law requiring cases of communicable diseases to be reported. The blanks on which reports are made to local health officers are to be furnished by the State board of health, and the law requires that these blanks shall be "of the general form adopted and approved by the State and Territorial health authorities in conference with the United States Public Health Service." (Public Health Reports, Apr. 14, 1916, p. 973.)

LAWS REQUIRING THE NOTIFICATION OF CASES OF PREVENTABLE DISEASE.

The progress which is being made in the State requirements for the notification of disease is shown by the following statement of the number of States in which the several enumerated diseases were notifiable by law or regulation in July, 1911, and the number in which they were notifiable in July, 1916. The development of morbidity reports indicates clearly the advances being made in health administration in the several States and the ever-widening scope of the work of the health departments.

Disease.	Number of States in which notifiable July, 1911.	Number of States in which notifiable July, 1916.
Actinomycosis	2	13
Anthrax	7	27
Beriberi	4	3
Cancer	1	5
Cerebrospinal meningitis	24	39
Chagres fever	1	1
Chicken pox	14	33
Cholera (Asiatic)	37	46
Dengue	5	11
Diphtheria	39	48
Dysentery	1	3
Epidemic dysentery	3	7
Erysipelas	3	9
Favus	1	6
German measles	3	19
Glanders	8	23
Gonococcus infection	1	10
Leprosy	21	36
Malaria	3	19
Measles	24	40
Mumps	4	18
Ophthalmia neonatorum	10	35
Pellagra	4	22
Plague	22	38
Pneumonia	6	14
Poliomyelitis	21	37
Puerperal fever	2	8
Rabies	5	24
Relapsing fever	1	6
Rocky Mountain (spotted) fever	1	10
Scarlet fever	38	47
Smallpox	43	49
Syphilis	2	11
Tetanus	5	13
Trachoma	8	31
Trichinosis	3	12
Tuberculosis (all forms)	22	38
Tuberculosis (laryngeal)	4	3
Tuberculosis (pulmonary)	9	8
Typhoid fever	26	43
Typhus fever	25	41
Uncinariasis	5	16
Whooping cough	19	38
Yellow fever	29	39

COMMUNICABLE DISEASES.

Control of communicable diseases.—General regulations for the control of communicable diseases were adopted by the State boards of health of Maine, Virginia, and West Virginia. These regulations cover the notification of cases, quarantine rules, school attendance of patients, convalescents, and persons who have been in contact with the sick, disinfection, conduct of funerals, and other matters. (Public Health Reports, July 7, 1916, p. 1801; July 28, 1916, p. 2034; July 14, 1916, p. 1880.)

Ophthalmia neonatorum.—The State Board of Health of New Hampshire required that cases of inflammation of the eyes of infants less than 2 years old must be treated by a physician, the city or town physician being required to act if the family is unable to pay for medical service. (Public Health Reports, June 30, 1916, p. 2129.)

By regulation the State Board of Health of West Virginia required physicians and midwives to use a 1 per cent solution of silver nitrate or any other silver preparation of equal effectiveness on the eyes of each child immediately after birth. (Public Health Reports, July 14, 1916, p. 1883.)

The State Board of Health of Ohio adopted regulations to carry into effect the Ohio act for the prevention of blindness from inflammation of the eyes of the new-born. The regulation provides for the prompt reporting of cases to the local health department and the sending of a report of the investigation and the history of each case to the State department of health. (Public Health Reports, Mar. 24, 1916, p. 796.)

Poliomyelitis (*infantile paralysis*).—The prevalence of poliomyelitis in New York City in June, July, and August, 1916, resulted in regulations being adopted in a number of States and in some cities for the purpose of preventing the introduction of the disease by children coming from infected localities. The special conference of State and Territorial health authorities with the United States Public Health Service recommended regulations for the prevention of the interstate and intrastate spread of the disease, and also "minimum regulations" for the control of the disease. (Public Health Reports, Sept. 1, 1916, p. 2322; Sept. 8, 1916, p. 2403.)

Tuberculosis.—The fact that the public is coming to realize the importance to the community of the losses caused by tuberculosis is evidenced by the great number of legislative enactments relating to the subject.

Among the measures adopted during the fiscal year ended June 30, 1916, the following may be mentioned:

The State Board of Health of California adopted comprehensive regulations intended to control the disease, including the notification of cases, the examination of sputum, the instruction of patients and members of the household, and the investigation by local health authorities of the conditions under which patients live. When a person suffering from tuberculosis removes from a city or town, the local health officer is required to notify the health authorities at the place to which the person is going.

The New Jersey Legislature authorized counties and municipalities to employ nurses for the purpose of discovering and investigating cases of tuberculosis, to aid in securing reports of such cases, and to assist generally in preventing the spread of the disease. The State authorized the payment from State funds of the sum of $3 per week for each person maintained by a county in a county tuberculosis hospital. (Public Health Reports, Aug. 4, 1916, p. 2120.)

The Wisconsin Legislature revised the law governing the medical examination of applicants for admission to the State tuberculosis sanatorium, and also the laws governing the admission of patients to county sanatoriums. Counties in Wisconsin were authorized to join in establishing and maintaining district tuberculosis hospitals. (Public Health Reports, Apr. 14, 1916, pp. 974–976.)

Carriers of disease.—The State Board of Health of Kansas required local health officers to investigate and report to the State board of health all cases of persons who, though apparently well, harbor the infective agent of any communicable disease, and provided for the taking of measures to protect the community. (Public Health Reports, June 30, 1916, p. 1733.)

An act passed by the Legislature of the State of New York requires the State commissioner of health to take measures for the protection of the community whenever "typhoid-fever carriers" are discovered, and provides for hospital treatment and maintenance of such persons at public expense if necessary. (Public Health Reports, July 7, 1916, p. 1807.)

Venereal diseases.—The Legislature of the State of Massachusetts appropriated $10,000, to be expended under the direction of the State department of health, for the purchase of drugs for the prevention of syphilis or to be used in making investigations as to the practicability of manufacturing such drugs for free distribution to boards of health, hospitals, dispensaries, and physicians. (Public Health Reports, June 30, 1916, p. 1737.)

Plague—Rat proofing of buildings.—The State Board of Health of Louisiana adopted a regulation requiring that "every building, outhouse, superstructure or substructure, lot, open area or other premise, sidewalk, street, or alley, now constructed or hereafter to be constructed, in all localities where human or rodent bubonic plague has been found, * * * shall be rat proofed."

Under the regulations structures are divided into two classes, and the materials to be used and methods to be adopted in the work are specified in detail. (Public Health Reports, July 7, 1916, p. 1796.)

Schools.—The legislature of the State of New York passed an act providing for the employment of medical inspectors in the public schools.

Pursuant to the provisions of law, the State commissioner of health and the State commissioner of education adopted regulations intended to secure the prompt reporting of cases of communicable disease which occur in schools and to prevent the spread of disease through the contact of school children with each other. (Public Health Reports, July 7, 1916, p. 1809.)

ORGANIZATION OF LOCAL HEALTH DEPARTMENTS.

New York.—A law of the State of New York, which was amended May 1, 1916, allows two or more towns, villages, or cities to combine into one health district, provided the approval of the State commissioner of health is secured. (Public Health Reports, July 7, 1916, p. 1811.)

HEALTH INSURANCE.

Massachusetts.—The Legislature of Massachusetts provided for a special commission to study the effects of sickness on employment and old age in the State and to collect facts as to actual experience with the several forms of social insurance and to recommend legislation to protect the wage earners of the Commonwealth from the burdens of sickness, unemployment, and old age, or any one or more of these, the report of the commission to be filed in January, 1917. (Public Health Reports, Aug. 4, 1916, p. 2119.)

HABIT-FORMING DRUGS.

The importance of preventing the improper use of habit-forming drugs has been realized by the legislatures of the several States, as is evidenced by the large number of laws on this subject passed during recent years. Many of the later of these laws are intended to supplement the Federal law known as the "Harrison antinarcotic act" and to take advantage of the information relative to the sale and distribution of habit-forming drugs which it is possible to secure because of the Federal law.

During the year the Public Health Service issued reprint from the Public Health Reports No. 330, which is a "Digest of laws and regulations relating to the possession, use, sale, and manufacture of poisons and habit-forming drugs enacted during 1914 and 1915 in force in the United States." This publication and Reprints 146 and 240, together with Public Health Bulletin No. 56, form a series which contains the legislation in force in the United States regarding poisons and habit-forming drugs.

MUNICIPAL HEALTH LAWS AND REGULATIONS.

Circulars are sent each month to the health officers of all cities in the United States which had a population of 10,000 or more in 1910, requesting copies of ordinances and regulations pertaining to public health. The ordinances and regulations thus secured are published currently in the Public Health Reports. The material is classified by cities, carefully indexed, and republished annually in the form of reprints.

The need for carefully drawn and effective regulations for controlling communicable diseases in cities is appreciated by sanitarians who have studied the problem of preventing the spread of disease in communities where large numbers of persons live and work in close proximity.

SUMMARY OF COURT DECISIONS, 1915–16.

During the fiscal year ended June 30, 1916, the publication of court decisions pertaining to public health was continued, and a digest and compilation of such decisions which were published prior to January 1, 1916, was issued as Reprint No. 342 from the Public Health Reports. The decisions are classified by subjects, and the digest makes possible ready reference to any point contained in any of the decisions.

The following is a statement of the principal legal questions pertaining to public health which were decided by the Federal and higher State courts during the year ended June 30, 1916:

PUBLIC-HEALTH ORDINANCES AND REGULATIONS.

The Supreme Court of Kansas decided that a city has the power to make stricter regulations and to impose more severe penalties than are provided by the laws of the State on the same subject. The court said: "An ordinance enacted in the exercise of the police power is not necessarily inconsistent with a State law on the same subject because the city provides for greater restrictions or makes higher standards than are provided or made by the statute." (Public Health Reports, June 9, 1916, p. 1499.)

In Nebraska it was decided by the supreme court that under the laws of that State the regulations of a municipal board of health were without operative force outside of the municipality. (Public Health Reports, July 21, 1916, p. 1949.)

HEALTH AUTHORITIES.

Duties of State commissioner of health.—The New York law made the State commissioner of health and the local health officer a board to consider objections to a proposed location for a county tuberculosis hospital and to approve or disapprove the location. The court held that service on such a board was a duty which could not be delegated by the State commissioner of health, and that the deputy commissioner of health could not lawfully act as a member of such a board except when he was performing the duties of the commissioner during his absence or inability to act. (Public Health Reports, June 23, 1916, p. 1643.)

In order to avoid the effect of this decision, the New York law was amended so as to make the deputy commissioner of health a member of the board when designated by the commissioner. (Public Health Reports, July 7, 1916, p. 1808.)

Ordinance can not be enforced when necessary funds are not available.—A resident of Sioux Falls, S. Dak., had in his home an employee who was suffering from smallpox. He requested the city health officer to remove the employee, but instead of complying the health officer quarantined the house. The resident ascertained that a city ordinance made it the duty of the health officer to remove to a hospital or some other safe and proper place all persons "sick with any infectious or pestilential disease," and he asked the court to compel the health officer to act in accordance with the requirements of the ordinance.

The evidence showed that no hospital had been erected and that no funds were available for the care of the patient. The Supreme Court of South Dakota decided that the health officer could not be compelled to remove the patient. (Public Health Reports, Mar. 10, 1916, p. 649.)

Civil service.—In Kansas City, Kans., a city health commissioner was appointed after competitive examination and certification by the civil service commission. It was later discovered that an error had been made in totaling the grades of the papers and that the wrong person had been certified for appointment.

The supreme court of the State decided that the appointment having been made in good faith it was valid notwithstanding the error. (Public Health Reports, Apr. 14, 1916, p. 967.)

A decision of the Washington Supreme Court emphasizes the necessity for complying with the civil-service laws when an employee of a health department is discharged. (Public Health Reports, May 26, 1916, p. 1337.)

Liability for negligence of employees of a health department.—A patient in the isolation hospital of Kansas City, Kans., contracted blood poisoning in a wound caused by getting a splinter from the floor in his foot. He sued the city for damages, but the court decided that the city was not liable because the health department in maintaining the hospital was performing a governmental duty. (Public Health Reports, July 14, 1916, p. 1875.)

VENEREAL DISEASES—ADVERTISING.

An Oregon law prohibited the publication of advertisements regarding medicines for the cure of venereal diseases or intended to imply that the advertiser could cure such diseases. The Supreme Court of Oregon decided that the law was constitutional. (Public Health Reports, Aug. 25, 1916, p. 2300.)

"PATENT" MEDICINES.

Sherley amendment.—The Supreme Court of the United States decided that, under the Sherley amendment to the United States pure food and drugs act, it was illegal to ship in interstate commerce packages of drugs which contained circulars making false claims as to the curative properties of the drugs. The court also decided that the Sherley amendment was valid. (Public Health Reports, Jan. 21, 1916, p. 137.)

Peddlers of drugs.—A California law which required itinerant vendors of drugs to secure a license and pay a tax was upheld by the State supreme court. (Public Health Reports, Feb. 18, 1916, p. 391.)

VACCINATION.

The board of health of Jefferson County, Ky., issued an order requiring that all children attending schools in School District No. 46, Highland Park, Ky., must be vaccinated, excepting such children as had been successfully vaccinated within seven years.

The board of trustees of the school district resisted the enforcement of the order, but the Court of Appeals of Kentucky decided that the board was authorized by the Kentucky laws to take the action and that the order must be complied with. (Public Health Reports, Aug. 11, 1916, p. 2173.)

LOCATION OF COUNTY TUBERCULOSIS HOSPITAL.

Persons living near the proposed site of a tuberculosis hospital objected to the location which had been selected. The chancery court of New Jersey decided that "the evidence submitted does not justify a conclusion that any danger to health exists or can be reasonably apprehended from the operation of this institution provided it is properly operated. In this view the only possible ground for relief is the claim that the establishment of the hospital is operative to materially reduce the market value of the adjacent real estate. That claim standing alone can not justify the relief here sought." (Public Health Reports, Mar. 24, 1916, p. 791.)

MARRIAGE OF DISEASED PERSONS.

In several recent cases courts have annulled marriages because of the fraud of one party in concealing from the other party the fact that he was suffering from disease. The New Jersey court of chancery decided that in such cases the proof of the diseased condition of the defendant must be clear and convincing. (Public Health Reports, Mar. 17, 1916, p. 733.)

RAT PROOFING OF BUILDINGS.

In 1914 the board of health of the city of New Orleans, La., adopted an ordinance requiring the rat proofing of all structures in the city. This ordinance was declared by the Supreme Court of Louisiana to be invalid because it did not provide for notice to property owners, and it delegated to the health officer discretionary authority which would enable him to discriminate between individuals as to work to be done and materials to be used.

During the year 1915 the city council of New Orleans adopted an ordinance which was in most respects identical with the first ordinance, but which was not subject to the objections which had been urged against it.

This latter ordinance has been held to be valid by the Louisiana Supreme Court (Public Health Reports, June 2, 1916, pp. 1437, 1440.)

HABIT-FORMING DRUGS.

Harrison antinarcotic law.—There had been considerable difference of opinion among the United States judges who had been called upon to construe section 8 of the Harrison antinarcotic law. This section makes it "unlawful for any person not registered under the provisions of this act who has not paid the special tax provided for by this act to have in his possession or under his control any of the aforesaid drugs." Some judges held that the words "any person" applied only to persons who in some manner dealt in habit-forming drugs and were required to register by the other sections of the act. Other judges held that the words were to be given their literal meaning, and that section 8 made it unlawful for any person who had not registered under the act to have habit-forming drugs in his possession except under circumstances which were specifically provided for.

On June 5, 1916, the Supreme Court of the United States decided that the words "any person not registered" in section 8 "can not be taken to mean any person in the United States, but must be taken to refer to the class with which the statute undertakes to deal—the persons who are required to register by section 1." This decision definitely determines the vexed question. (Public Health Reports, June 16, 1916, p. 1561.)

The United States District Court for the Southern District of Ohio decided that only physicians who are engaged in the legitimate practice of their profession are entitled to register under the Harrison antinarcotic law, and that a physician who does not personally attend his patients, but who prescribed for them upon their written statements and distributes to all the same preparation, is not engaged in the legitimate practice of his profession and consequently is not entitled to register under the law. (Public Health Reports, Jan. 28, 1916, p. 193.)

The United States District Court for the Western District of Tennessee decided that a person who induced another person to ship opium from one State to another, neither of the persons having registered under the Harrison antinarcotic law, was guilty as a principal of violating the law.

The same court also decided that under the Federal law of January 17, 1914, the mere possession of opium prepared for smoking constitutes an offense unless the person having the opium in his possession can show that it was not imported after April 1, 1909. (Public Health Reports, Apr. 28, 1916, p. 1089.)

The United States District Court for the Northern District of New York decided that the Harrison antinarcotic law prohibits the issuance by a physician of a prescription for a larger amount of habit-forming drugs than is necessary for the treatment of his patient. (Public Health Reports, May 12, 1916, p. 1203.)

The United States District Court for the Western District of Tennessee had previously decided that the Harrison law did not limit the amount of habit-forming drugs which might be prescribed by a physician. (Reprint No. 342, p. 144.)

Possession of cocaine unlawful.—In North Carolina it was decided that a State statute which made the possession of cocaine unlawful except under certain specified circumstances and made its possession prima facie evidence of a violation of the statute was valid. (Public Health Reports, Mar. 3, 1916, p. 549.)

Sale to minor—Damages.—In New York State damages were awarded to a mother for the sale of heroin to a minor child. The use of the drug resulted in the boy becoming a confirmed drug addict. (Public Health Reports, June 16, 1916, p. 1563.)

OCCUPATIONAL DISEASES AND WORKMEN'S COMPENSATION LAWS.

During the fiscal year the courts of several States were called upon to decide questions which arose from injuries to workmen which were caused or aggravated by diseases from which the workmen suffered.

The Massachusetts Supreme Judicial Court reaffirmed the principles laid down in earlier decisions and decided that pneumonia induced by exposure in the course of employment is within the terms of the Massachusetts workmen's compensation act. The same court also held that the fact that an employee is suffering from a disease does not deprive him of the right to compensation for an injury which arises out of and in the course of his employment, even though the injury would not have occurred had the employee been in good health. (Public Health Reports, Feb. 18, 1916, p. 395.)

Gonorrheal infection.—The Supreme Court of Michigan decided that a workman was entitled to compensation for injury to his eye caused by gonorrheal infection, which was probably caused by the attempt of a fellow workman to remove a piece of steel from his eye. (Public Health Reports, May 12, 1916, p. 1206.)

Poison ivy—Tuberculosis.—The New York Supreme Court affirmed awards allowing compensation for death which resulted indirectly from poisoning by poison ivy, and for disability caused by tuberculosis which followed exposure and pleurisy. (Public Health Reports, Apr. 14, 1916, p. 969, and June 30, 1916, p. 1719.)

Occupational diseases.—The Supreme Court of Ohio decided that the Ohio workmen's compensation law did not cover cases of occupational disease. This decision was based upon the history of the law, which the court considered indicated the intention of the legislature to exclude occupational diseases from its provisions. (Public Health Reports, May 19, 1916, p. 1269.)

Dizziness caused by disease.—In Rhode Island compensation was awarded to a hack driver for injuries caused by a fall from the seat of his hack, although the evidence showed that the fall was at least partly "due to dizziness or unconsciousness induced by a disease from which he was suffering." (Public Health Reports, May 5, 1916, p. 1147.)

Typhoid fever.—In Wisconsin it was held that death resulting from typhoid fever, caused by polluted drinking water furnished by an employer, was within the terms of the Wisconsin workmen's compensation law. (Public Health Reports, Feb. 11, 1916, p. 329.)

Hernia.—The Supreme Court of Michigan has reaffirmed a previous decision that occupational diseases are not included within the terms of the Michigan workmen's compensation law, but the court has also decided that an employee who suffered from hernia, which was discovered shortly after severe muscular exertion and strain, was entitled to compensation, on the ground that the hernia was the result of an "accidental injury." (Public Health Reports, Sept. 1, 1916, p. 2375.)

Frostbite—Erysipelas.—The Connecticut Supreme Court of Errors decided that a widow is entitled to "compensation" under the Connecticut workmen's compensation law for the death of her husband, which resulted from erysipelas that developed after frostbite. He was an insurance solicitor and his duties required him to endure exposure to severe cold, which the compensation commissioner decided was the "proximate cause" of his injury. (Public Health Reports, Aug. 25, 1916, p. 2299.)

FOODSTUFFS.

The Illinois law held to be valid.—The Supreme Court of the United States decided that a statute of the State of Illinois prohibiting the use of boric acid in food was valid, and the construction placed upon the law by the Illinois Supreme Court was followed by the Supreme Court of the United States. (Public Health Reports, Jan. 14, 1916, p. 79.)

The Federal law.—The United States Circuit Court of Appeals of the Second Circuit decided that when a question arises under section 7 of the Federal pure food and drugs act, whether an article of food contains substances which are injurious to health, this question should be submitted to the jury for decision. (Public Health Reports. Mar. 3, 1916, p. 550.)

Liability of manufacturers.—The Supreme Court of Tennessee was called upon to consider the question of the liability of a manufacturer for injuries caused by poisonous substances contained in foodstuffs. The conclusion reached was that the manufacturer owes a high duty to the public and that he is liable for a failure to properly perform that duty, but "negligence is a necessary element in the right of action" and "there is no logical basis of liability for personal injury without some negligent act or omission." (Public Health Reports, Apr. 21, 1916, p. 1022.)

Trichinæ in pork.—The Supreme Court of Pennsylvania held that a meat packer was liable for damages for deaths resulting from eating pork which contained trichinæ. In New York a dealer who sold pork which contained trichinæ was held liable. In both of these cases it was contended that the seller was not responsible for the condition of the pork because it had been inspected by a Federal inspector, but the courts held that this did not relieve either the manufacturer or the dealer from responsibility. (Public Health Reports, June 23, 1916, p. 1646; July 7, 1916, p. 1793.)

Cold storage.—Section 337 of the New York public health law prohibits the storage of foodstuffs in cold-storage warehouses for more than 10 months. This law was upheld by the appellate division, first department, of the New York Supreme Court. The city court of Buffalo, however, decided that the section is unconstitutional, holding that its purpose and effect are not to protect the public health but to prevent the owners of foodstuffs from holding them for long periods to force up prices. (Public Health Reports, Aug. 18, 1916, p. 2235.)

Unwholesome fish—Damages.—The Supreme Court of North Carolina decided that a packer who negligently puts upon the market unwholesome fish is liable for damages for injury caused by eating such fish. The defendant knew before the fish were sold by the retailer that other fish from the same lot had caused illness, but he failed to give notice promptly. (Public Health Reports, Aug. 25, 1916, p. 2302.)

PROTECTION OF WATER SUPPLIES.

The Supreme Court of Errors of Connecticut granted an injunction against the continuance of a pleasure resort located on a reservoir which was the source of water supply for a city. The proprietor of the resort was awarded damages. (Public Health Reports, July 28, 1916, p. 2031.)

In Pennsylvania it was decided that a water company was not entitled to payment during the time that the water furnished by it was impure and unsuitable for the purposes for which it was to be used. (Public Health Reports, Mar. 31, 1916, p. 859.)

POLLUTION OF STREAMS BY SEWAGE.

The right of a municipality to discharge sewage into nonnavigable streams in sufficient quantity to cause pollution of the water was considered by the courts of Oregon, New York, and Virginia. (Public Health Reports, Feb. 25, 1916, p. 465; Jan. 7, 1916, p. 29; Apr. 14, 1916, p. 970.)

USE OF SECOND-HAND MATERIAL IN MATTRESSES.

In 1915 the Illinois Legislature passed an act prohibiting the use of second-hand material in making mattresses, quilts, or bed comforters which were to be sold.

The supreme court of the State decided that the law was unnecessary for the protection of health, as disinfection of the material would effectually safeguard the public. The law was declared unconstitutional. (Public Health Reports, Apr. 21, 1916, p. 1019.)

MARINE HOSPITALS AND RELIEF.

RELIEF STATIONS.

During the fiscal year ended June 30, 1916, the service operated 21 marine hospitals, all of which are owned by the Government, and maintained 125 other relief stations where hospital and out-patient relief was furnished patients. In addition, the service maintained a sanatorium at Fort Stanton, N. Mex., for the care and treatment of patients suffering from tuberculosis. Because of the decrease in the number of patients the marine hospital at Cairo, Ill., was closed during the year and a contract made with a local hospital for the care of patients at that place.

RELIEF TO SEAMEN AND OTHERS.

There were 68,458 patients treated at the various marine hospitals and relief stations of the service during the year, including the patients treated at the tuberculosis sanatorium at Fort Stanton, N. Mex. Of this number, 17,524 patients were treated in hospitals a total of 484,408 days, and 50,934 patients were treated at dispensaries a total of 97,263 times. During the same period 467 seamen employed on foreign vessels received hospital treatment a total of 6,843 days. In addition to the foregoing, medical officers detailed for duty on board various vessels of the Coast Guard furnished a great deal of medical relief during the year to members of such vessels, to seamen employed on fishing vessels, and to natives of Alaska. The following is part of a report made by Asst. Surg. W. F. Fox, United States Public Health Service, on local health conditions, etc., observed during the Alaskan cruise of the Coast Guard cutter *Unalga*, which left Seattle, Wash., on April 20, 1916, and returned to that port on August 18, 1916:

GENERAL REPORT ON LOCAL HEALTH CONDITIONS AND OTHER MATTERS OF SANITARY INTEREST OBSERVED DURING THE CRUISE.

KODIAK.

On the way to our headquarters at Unalaska we stopped for several hours at Kodiak, Kodiak Island. It is well protected by the mountains, some of which are 2,500 feet in altitude. The climate is stated to be milder than to the westward. It has a population of about 500, mostly natives. They are of the Aleutian type of native, hard to teach and not overinclined to work. Their chief occupation is that of fishing.

Their general health is good, outside of the ever-prevailing cases of tuberculosis and syphilis. The last epidemic, one of measles, was 2½ years ago. Last year there were several cases of typhoid fever on Woody Island directly across from Kodiak.

UNALASKA.

Unalaska was our next stop. It is well protected by the mountains surrounding it. It has a very damp climate, the rainy seasons being the spring and the fall. The average temperature for the winter is about 30° F. and for the summer about 60°. It has a population of about 300, with more males than females.

The natives are lazy and uncleanly. Personal hygiene is sadly lacking. They universally have poor teeth, numerous missing teeth and cavities, and often pyorrhea alveolaris. Babies were seen with not a single healthy tooth. There are between 60 and 70 buildings in the village. The chief occupation of the natives is fishing and working in near-by canneries and for the Alaska Commercial Co.

The general health of the village is fair. During the year ending December 31, 1915, there were 9 births, 15 deaths, and 11 marriages. There are no special prevailing diseases outside of a goodly number of tuberculous cases. Syphilis is undoubtedly present to a great degree, although no active cases were seen. The last epidemic, one of la grippe, occurred last winter and affected the entire village. This was preceded by an epidemic of whooping cough. The last epidemic of measles was in 1900. The only case of typhoid fever known of by the local physician occurred over 15 years ago. One case of trachoma was found in a boy 2 years old from Dutch Harbor, which is about a mile from Unalaska. Although examinations were made, no other case was observed in Dutch Harbor or Unalaska. Tapeworms are said to be common, but the natives do not apply for treatment. Numerous cases of diarrhea from eating dried fish and turnips are reported quite frequently.

Natives come here from all parts of the Aleutian Islands for treatment. Unless the local physician is a surgeon also, in many cases no relief is afforded them. The local physician, Dr. A. W. Newhall, who has been with the Jesse Lee Home for several years, has left and will not return for a year or more. His place had not been filled when we left and it was stated that there would be no physician or trained nurse there during the coming winter.

The water supply comes from various sources. The majority of the natives obtain their water directly from the creek behind the village. This creek is the outlet of a lake to the eastward and behind the village. The Jesse Lee Home pump their water directly from this lake. The Alaska Commercial Co. have a reservoir in the hills behind the village. This reservoir supplies the company store, schoolhouse, the marshal's home, and one other. The reservoir has a muddy bottom and appears to be nothing more than a stagnant pool. It is, however, good drinking water, although at times it is full of small red bugs and is slightly cloudy. Bacteriological examination using lactose peptone broth in culture tubes as media was negative. Chemically, chlorides were not in excess. There is also a pipe down to the wharf from which vessels obtain their supply of water. The Coast Guard cutters and a few natives obtain their water from this source. The collector of customs and six other families get their water from a spring just to the eastward of the company's reservoir. There is still another spring near by that supplies three families. Three of the natives have wells.

Fish is, of course, the natives' chief article of food. It is stated that they are very fond of raw turnips and eat them to excess.

A letter relative to the use of Crede's method in the new born for the prevention of ophthalmia neonatorum was sent to the local priest, the marshal, and the chief of the village. A bottle of the 1 per cent silver nitrate solution was also furnished to each. The priest was requested, by letter and in person, to translate the instructions into the native tongue in order that the native midwives would understand. The midwives were also seen personally and through an interpreter the method was explained.

It would seem as though a medical representative of some department of the Government should be stationed here for not more than a year at a time, or, if not this, that the local physician should be a representative of the Government, even if he only received a small salary.

It is suggested that a dental surgeon in the employ of the Government make an annual visit to this and other villages.

ATKA.

The next village visited was Atka. This is on Atka Island, one of the Aleutian Islands, about 300 miles from Unalaska. The climate is damp—raining or snowing most of the time. The average extreme temperatures are: For the winter, 16° F.; for the summer, 65° F.

The total native population is 48, of whom there are an equal number of males and females. There are usually two white school teachers here. The natives are said to be industrious, but have no morals. There are 8 wooden buildings, 5 having three rooms and 3 having two rooms, and 7 barabaras. Their occupation is trapping and basket weaving.

The general health of the village was fairly good. During the past year there were 2 births, 8 deaths, and 3 marriages. Tuberculosis is present to quite an extent—physical examinations demonstrated this. Syphilis is said to be present, but no active cases were seen. The last epidemic, one of whooping cough, occurred last fall. There is no physician or trained nurse for the village, and the nearest one is at Unalaska.

The water supply is from a creek behind and also running through the village. Some of the water drains through a cemetery situated on a hill above the creek. The chief food of the natives is fish and ducks. Canned goods may be obtained at the Government store.

Most of the buildings and barabaras are not in a sanitary condition. They are crowded and not ventilated. Personal hygiene is sadly lacking. Most of the natives, and many of the children especially, have very poor teeth.

While the school teachers here seem to do all in their power to help the natives in a medical way, their medical knowledge is of course limited. A letter relative to the use of Crede's method in the new born was sent to the teacher, and a bottle of the silver nitrate solution was also furnished.

ST. GEORGE.

The next village visited was St. George, on St. George Island, one of the Pribilof Islands. For the winter the average extreme temperature is 10° below and for the summer 55° above zero. It rains all the year and is usually foggy and windy.

The native population numbers about 121, of whom 58 are males and 63 females. This was for the year ending June 30, 1915. There are seven white people on the island. The natives are stated to be of the better type but immoral. There are about 25 dwellings. Their chief occupation is sealing and fox hunting. The natives are wards of the Government.

Their general health has been good. During the year ending June 30, 1915, there were five births, one death, and one marriage. Tuberculosis is quite prevalent. The majority of the deaths since 1870 has been from tuberculosis in some form. It is stated that syphilis or venereal disease in any form is not prevalent. The last winter there were epidemics of whooping cough and gastroenteritis. The local physician, Dr. H. P. Adams, of the Bureau of Fisheries, states that he has not seen any cases of trachoma or typhoid fever on the island.

The water supply is from two surface wells. One supplies the Government buildings, which the white people occupy, and the other supplies the natives.

ST. PAUL.

The next village visited was St. Paul, on St. Paul Island. The climate is very much the same as that of St. George. The native population numbers 191, of whom 90 are males and 101 females. There are 11 white people on the island. The natives are of the better type, although personal hygiene is lacking. There are about 40 or 50 buildings. The natives are wards of the Government, and their chief occupation is sealing and fox hunting.

Their general health has been good. During the year ending June 30, 1915, there were 11 births, 5 deaths, and 2 marriages. A small building was recently turned into a hospital and equipped. A native nurse is on hand all the time, and there is a class in training of young native women. It is stated that venereal disease is not prevalent. Last winter there was an epidemic of la grippe.

UNGA.

A brief stop was made at the village of Unga, Unga Island. The population appears to consist chiefly of whites. There is a cannery near by. Their chief occupation is fishing. The people all seemed to be healthy. The buildings are mostly well located and well kept. There is no physician here. Recently after a shooting affray assistance had to be obtained by sending a wireless to one of the Coast Guard cutters for help. The only objectionable feature seen in the village was the dumping of refuse, etc., along a little stream running through the village, especially near the beach. It would seem as though some department of the Government should have a representative of the medical profession stationed here.

Brief stops were also made at Anchorage, Seward, and Valdez. Of these towns Anchorage seems to be the best located.

PHYSICAL EXAMINATIONS.

The medical officers of the service made 37,985 physical examinations of candidates for various positions during the year as noted under the special headings given below:

United States Coast Guard.—One thousand eight hundred and twenty-nine applicants for enlistment and reenlistment were examined, of which number 641 were rejected. The services of 21 acting assistant surgeons were continued during the year for the physical examinations of keepers and surfmen at points not easily accessible to regular officers at stations of the service.

Steamboat-Inspection Service.—Three thousand five hundred and seventy applicants were physically examined for license as master, mate, or pilot, of which number 90 were rejected.

Merchant seamen of the United States.—Physical examinations were made of 30,179 American seamen, of which number 3,167 were rejected.

Coast and Geodetic Survey.—Two hundred and seventeen applicants were examined, of which number 20 were rejected.

Lighthouse Service.—Forty-five applicants were examined, of which number none was rejected.

Foreign seamen.—Two hundred and forty-five seamen employed on foreign vessels were examined, of which number 17 were rejected.

Immigration Service.—Three hundred and eighty-two persons connected with the Immigration Service were physically examined, of which number 20 were rejected.

Civil Service Commission.—One thousand five hundred and three applicants for appointment to the Government service were examined, of which number 138 were rejected.

Panama Canal Zone.—Two applicants for appointment in the Panama Canal Zone were examined, of which one was rejected.

Philippine Islands.—Thirteen applicants were examined for service in the islands, of which number none was rejected.

PURVEYING DEPOT.

The following statistics show the transactions of the purveying depot during the fiscal year:

Supplies purchased.

Drugs and chemicals	$17, 457. 06
Surgical instruments and appliances	16, 892. 50
Beds, bedding, etc	13, 098. 09
Dry goods	5, 099. 89
Furniture	2, 829. 53
Miscellaneaus	2, 684. 50
Alcohols, wines, etc	2, 052. 30
Books and journals	1, 924. 20
Kitchen utensils and tableware	1, 731. 09

Hardware	$1,673.68
Rubber goods	1,353.82
Glass bottles	1,173.58
Electric lamps	1,075.20
Flags	760.82
Bacteriological supplies	642.62
Packing materials	454.61
Pharmacal implements	156.33
Total	71,059.82

CREDIT.

By bills paid direct from funds:		
Maintenance	$10,685.53	
Quarantine	4,277.29	
Furniture	2,704.81	
Care of seamen	1,780.32	
Special studies of pellagra	1,145.70	
Epidemic	246.65	
Field investigations	182.89	
United States Coast Guard	57.75	
Interstate quarantine	17.20	
		21,098.14
Total		49,961.68
By amounts reimbursed from other appropriations for supplies issued from stock:		
Quarantine	$2,988.24	
Epidemic fund	1,425.71	
Special studies of pellagra	231.52	
Field investigations	93.73	
Rural sanitation	79.61	
United States Coast Guard	74.66	
National quarantine and sanitation	51.25	
Interstate quarantine	48.31	
Contingent expenses, miscellaneous, Treasury Department	4.33	
Maintenance Hygienic Laboratory	3.00	
		5,000.36
Net expenditures chargeable to appropriation for purveying depot (in amount, $45,000)		44,961.32
Salaries	$6,849.33	
Operating expenses	152.45	
		7,001.78
Total net expenditures		51,963.10
Number of requisitions filled		816
Number of packages shipped from depot		2,153
Total weight of supplies shipped from depot (pounds)		162,412
Total weight of supplies shipped direct to stations by contractors (pounds)		283,138

TUBERCULOSIS SANATORIUM AT FORT STANTON, N. MEX.

REPORT FOR THE YEAR ENDED JUNE 30, 1916.

[By F. C. Smith, Surgeon.]

General information.

Number of patients present July 1, 1915	202
Number of patients admitted during the year	144
Total number treated during the year	346

Number of patients discharged during the year		149
Number of deaths (included in preceding item)		40
Number of bodies interred in sanatorium cemetery		39
Number of patients present June 30, 1916		197
Minimum number of patients during the year (June 30, 1916)		197
Maximum number of patients during the year (February, 1916)		243
Total days treatment furnished patients		82.061
Number of officers and attendants		87
Number of patients who left against advice		46
Number of patients who returned at their own expense	17	
Number of patients retransferred	5	
Total number readmitted		22
Number of patients discharged for causes affecting discipline		2
Number of patients transferred to other station (dyspnœa)		1
Number of physical examinations during year		1, 333

Average duration of stay of patients discharged, 1 year 5 months 9 days.
Minimum stay, 14 days.
Maximum stay, 7 years 7 months 9 days.

Patients discharged during the year, with stage of disease and result of treatment.

	Apparently cured.	Arrested.	Improved.	Not improved.	Died.	Total.
Incipient	14	2			3	19
Moderately advanced	11	14	6	2	4	37
Far advanced		21	24	14	33	92
Nontuberculous			1			1
Total	25	37	31	16	40	149

Prognosis on arrival.

Favorable for arrest	91
Favorable for prolongation of life by living under proper conditions	40
Unfavorable	16
Grave	2
Total	149

CAUSE OF DEATH.

Of the 40 who died, 27 had been present more than one year and 3 less than one month. Thirty-four autopsies were performed. Six deaths were due to pulmonary hemorrhage, one to mania a potu shortly after admission, and one to malignant disease. Ten of the fatal cases had tuberculous complications of other vital organs besides lung involvement. Three additional deaths occurred among tuberculous attendants who were not patients.

TREATMENT.

Induced pneumothorax has been continued in 28 selected cases: in 18 others pleural adhesions prevented successful compression. The total number of such treatments given during the year was 897, the largest number to one patient was 59.

Pyorrhea alveolaris studies were continued; 2,478 local treatments and 445 hypodermic injections of emetin were administered. The resident dentist rendered the usual institutional relief, which included 94 extractions, 108 fillings, and 426 other treatments. Eye, ear, nose, and throat treatments numbered 2,951. Fifty-four surgical operations were performed.

The supervision of exercise and rest continues to rank first in importance in routine treatment. The work squads performed 4,789 man-hours of labor and the walking squads 1,106. The aggregate earnings of those privately employed amounted to $5,018.67, while those convalescent or recovered who worked as attendants received $12,153.34. More than 30 per cent of the salaries paid attendants went to patients or ex patients, and a total of $17,172 was earned by them.

The laboratory work consisted chiefly of routine work, 2,264 specimens being examined. Thirty-two attendants were vaccinated against typhoid. The library issued 2,825 books and 4,722 magazines.

The weekly four-film moving-picture show was conducted, 52 regular and 9 special entertainments being given to an average attendance of 150. This and other amusements were provided, without expense to the Government and free to unemployed patients, by the Amusement Association, which collected and expended $1,126.46.

ECONOMIES.

Sixty gallons of liquid soap and 7,350 gallons of soft soap were made and used, waste tallow being chiefly used. Seventy-one quarts of flavoring extracts for use in bake shop and kitchens and most of the baking powder used were made in the dispensary. Powdered and solid extracts of drugs in stock were made up into tinctures needed, and an overstock of drugs, stains, and chemicals returned to the purveying depot for redistribution. Sixty-three pillows were remade; 150 suits of hospital pajamas and 80 kitchen aprons were made by station labor.

A property and stock accounting system has been developed in charge of the property clerk by which the location of any article and the amount on hand of all material, as well as the authority for the removal or issuing of the same, are readily ascertainable.

COST OF MAINTENANCE.

The cost per diem, $1.7982, shows an increase owing to higher prices and to extensive repairs. The purchased ration cost $0.3636 per capita, the total ration cost $0.6108, figuring beef and milk at cost of production, or $0.7132, figuring station products at market price.

Repairs and renewals of equipment cost $31,130.56. This includes $11,600 for concreting the south reservoir, thus providing storage for a million gallons of water.

Items of expenditure.

Item.	Per annum.	Per patient per day.
Salaries:		
Medical officers and pharmacist	$10,112.89	$0.1231
Office force	4,732.16	.0577
Power plant	2,820.00	.0344
Mechanics	3,022.67	.0368
Nurses and orderlies	3,616.00	.0441
Cooks and waiters	6,033.17	.0735
Laundry	1,320.00	.0161
Dairy	2,030.33	.0247
General	2,192.00	.0267
Range	928.00	.0113
Farm	5,820.00	.0709
Total	42,627.22	.5193
Materials and supplies:		
Subsistence supplies	40,285.53	.4909
Dispensary and laboratory	484.75	.0059
Table and kitchen ware	2,060.48	.0251
Laundry supplies	881.54	.0107
Care of insane seamen at State asylum	416.00	.0051
Wood	5,233.93	.0638
Furniture	741.65	.0090
Power plant (includes coal)	11,359.12	.1384
Freight and transportation	1,818.53	.0222
Mechanical equipment of public buildings	2,102.89	.0256
Repairs and preservation of public buildings	20,375.55	.2483
Repair materials—maintenance	1,595.19	.0195
Carpenter's, plumber's, and painter's tools	378.36	.0046
Dairy supplies	637.24	.0078
Forage	14,268.72	.1739
Range supplies	158.57	.0019
Farm	3,647.28	.0445
Burial of seamen	374.40	.0045
Miscellaneous	1,734.33	.0211
Total	108,554.06	1.3228
Salaries	42,627.22	.5193
Total expenditure	151,181.28	1.8421
Reimbursements from officers and others for subsistence supplies $1,941.12		
Receipts from sale of beef hides and cement bags 1,664.11		
	3,605.23	.0439
Net expenditure	147,576.05	1.7982

FARM AND HERD.

Reckoning beef and milk at market prices, the range herd, dairy, alfalfa, and orchard have been operated at a considerable profit, and poultry, hogs, and garden at a loss. Without taking credit for increment in number of animals and without considering original investments and cost of repairs to farm buildings, all farming operations for the year show a credit of $9,703.38. All the adult dairy cattle, 125 in number, were given the periodical tuberculin test with uniformly negative results. Some vegetable poison, presumably frosted oak leaves, killed 33 yearling cattle, and an epidemic of ulcerative stomatitis among the swine caused a loss of 120 animals. The number of animals on hand varies with the natural increase and the number slaughtered or lost; on June 30, 1916, there were on hand 495 swine, 78 horses, mules, and colts, and 2,233 cattle, including 457 young calves.

PERSONNEL.

COMMISSIONED MEDICAL OFFICERS.

At the commencement of the fiscal year, July 1, 1915, the commissioned corps consisted of the Surgeon General, 1 assistant surgeon general at large, 12 senior surgeons, 70 surgeons, 39 passed assistant surgeons, and 63 assistant surgeons.

The changes during the fiscal year were as follows: One surgeon was promoted to grade of senior surgeon to fill a vacancy. Seven passed assistant surgeons were promoted to the grade of surgeon, 3 assistant surgeons to the grade of passed assistant surgeon, and 8 candidates who passed the examination required by the laws and regulations of the service were commissioned assistant surgeons. On account of physical disability, 3 surgeons and 2 passed assistant surgeons continued on waiting orders and 1 senior surgeon and 2 surgeons were placed on waiting orders. Of this number, 2 have died during the fiscal year.

At the close of the fiscal year, the commissioned medical corps consisted of the Surgeon General, 1 assistant surgeon general at large, 13 senior surgeons, 72 surgeons, 37 passed assistant surgeons, and 63 assistant surgeons. One senior surgeon and five surgeons were upon detail in the bureau as assistant surgeons general, in accordance with the act approved July 1, 1902.

Assignments.—Among other assignments of commissioned medical officers during the fiscal year were the following: Twenty-seven were assigned to exclusive immigration duty, their services being supplemented by employment of acting assistant surgeons; 5 to the quarantine service of the Philippine Islands; 11 to vessels of the Revenue Cutter Service; 22 to the quarantine stations in the continental United States, Porto Rico, and the Hawaiian Islands; 3 to duty in foreign coutries to prevent the introduction of epidemic diseases into the United States.

Special details.—One commissioned medical officer continued on detail duty under the Governor of the Panama Canal. Surg. John D. Long was continued as chief quarantine officer and director of health of the Philippine Islands.

Field investigations of public health.—In accordance with the act of Congress approved August 14, 1912, authorizing the service to study and investigate the diseases of man, and conditions influencing the propagation and spread thereof—including sanitation and sewage, and the pollution either directly or indirectly of the navigable streams and lakes of the United States—the following officers and corps of special assistants were detailed to make these special investigations:

RURAL SANITATION.

[Headquarters, Hygienic Laboratory, Washington, D. C.]

Surg. L. L. Lumsden, in charge.
Surg. M. J. White, executive officer, Marine Hospital, St. Louis, Mo.
Asst. Surg. W. H. Slaughter,
Asst. Surg. J. G. Townsend.
Asst. Surg. K. E. Miller.
Asst. Surg. H. C. Yarbrough.
Asst. Surg. R. E. Wynne.
Asst. Surg. W. C. Witte.
Asst. Surg. P. M. Stewart.
Asst. Surg. R. R. Sayers.
Asst. Surg. D. J. Prather.
Asst. Surg. R. L. De Saussure.
Asst. Surg. T. B. H. Anderson.
Asst. Epidemiologist F. E. Harrington.
Asst. Epidemiologist C. C. Applewhite.
Field Investigator W. K. Sharp, Jr.
Field Investigator Quintard Taylor.
Field Investigator K. R. Glennan.
Field Investigator H. S. Mustard.
Field Investigator W. B. McWhorter.
Field Investigator J. D. Applewhite.
Field Investigator Thos. Parran.
Field Investigator R. R. Sandidge.
Field Investigator M. V. Ziegler.
Field Investigator B. S. Burnett.
Field Investigator Samuel Saunders.
Field Investigator M. F. Haralson.
Field Investigator F. A. Reuter.
Field Investigator E. R. Hunter.

FILARIASIS.

[Headquarters. United States Marine Hospital, Savannah, Ga.]

Surg. Edward Francis, in charge.

MALARIA.

[Headquarters, Marine Hospital, New Orleans, La.]

Surg. R. H. Von Ezdorf, in charge.
Asst. Surg. R. C. Derivaux.
Sanitary Engineer J. A. A. Le Prince.
Technical Asst. M. B. Mitzmain.
Asst. Epidemiologist T. H. D. Griffitts.

PELLAGRA.

[Headquarters, Hygienic Laboratory, Washington, D. C.]

Surg. Jos. Goldberger, in charge.

Field Station, Spartanburg, S. C.

Asst. Surg. G. A. Wheeler, in charge.
Public Health Statistician Edgar Sydenstricker.
Special Expert W. J. Lauck.
Field Investigator Frances W. Valentine.
Field Investigator Caroline E. Wilson.
Field Investigator George A. Decell.
Field Investigator Ammen Burger.

Epworth Sanitorium, Columbia, S. C.

Asst. Surg. William F. Tanner.

State Sanatorium, Milledgeville, Ga.

Asst. Epidemiologist D. G. Willetts.

Methodist Orphanage, Jackson, Miss.

Asst. Surg. C. H. Waring.

PELLAGRA—Continued.

Pellagra Hospital and Laboratory, Spartanburg, S. C.

Passed Asst. Surg. R. M. Grimm, in charge.
Asst. Surg. M. H. Neill.
Asst. Surg. R. L. Allen.
Pharmacist L. G. Smith.
Biochemist M. X. Sullivan.
Asst. Biochemist Carl P. Sherwin.
Organic Chemist George F. White.
Food Analyst Kenneth K. Jones.
Dietitian Maude Fauquier.

PREVENTION OF TRACHOMA.

[Headquarters, Post-office Building, Lexington, Ky.]

Surg. John McMullen, in charge.
Pharmacist Chas. G. Carlton.

Trachoma Hospital, Hindman, Ky.

Acting Asst. Surg. R. W. Raynor.

Trachoma Hospital, London, Ky.

Acting Asst. Surg. J. C. Johnston.

Trachoma Hospital, Jackson, Ky.

Acting Asst. Surg. T. F. Wickliffe.

Trachoma Hospital, Coeburn, Va.

Acting Asst. Surg. C. E. Downes.

Trachoma Hospital, Welch, W. Va.

Acting Asst. Surg. Paul D. Mossman.

Trachoma Hospital, Tazewell, Tenn.

Acting Asst. Surg. J. L. Goodwin.

ROCKY MOUNTAIN SPOTTED FEVER.

[Headquarters, Victor, Mont.]

Surg. L. D. Fricks.

INVESTIGATION OF NAVIGABLE WATERS.

[Headquarters, Third and Kilgour Streets, Cincinnati, Ohio.]

Passed Asst. Surg. W. H. Frost, in charge.
Passed Asst. Surg. Paul Preble.
Passed Asst. Surg. L. R. Thompson.
Asst. Surg. Jos. Bolten.
Asst. Surg. H. F. Smith.
Pharmacist F. A. Southard.
Epidemiologist A. W. Freeman.
Research Attorney S. D. Montgomery.
Plankton Expert W. C. Purdy.
Sanitary Engineer J. K. Hoskins.
Sanitary Engineer R. E. Tarbett.
Sanitary Engineer H. W. Streeter.
Sanitary Engineer H. R. Crohurst.
Sanitary Engineer W. G. Stromquist.
Sanitary Bacteriologist E. M. Myer.
Sanitary Bacteriologist H. M. Campbell.
Sanitary Bacteriologist E. E. Smith, 2d.
Sanitary Bacteriologist C. T. Butterfield.

POLLUTION OF COASTAL WATERS.

[Headquarters, Hygienic Laboratory, Washington, D. C.]

Surg. H. S. Cumming, in charge.
Passed Asst Surg. H. E. Hasseltine.
Asst. Surg. Francis A. Carmelia.
Asst. Surg. C. E. Waller.
Sanitary Chemist W. F. Wells.
Sanitary Engineer C. N. Harrub.
Sanitary Bacteriologist Sol. Pincus.
Sanitary Bacteriologist M. V. Veldee.

SEWAGE DISPOSAL.

Sanitary Engineer L. C. Frank.
Sanitary Bacteriologist C. P. Rhynus.
Sanitary Bacteriologist H. L. Shoub.

INDUSTRIAL WASTES.

Sanitary Chemist H. B. Hommon.
Sanitary Engineer H. H. Wagenhals.
Sanitary Bacteriologist W. E. Brown.
Sanitary Bacteriologist J. W. McBurney.
Sanitary Bacteriologist E. J. Theriault.
Sanitary Bacteriologist W. v. D. Tiedman.

PUBLIC HEALTH ORGANIZATION AND ADMINISTRATION.

Surg. G. B. Young, Minneapolis, Minn.
Surg. Carroll Fox, Youngstown, Ohio.

SCHOOL HYGIENE.

[Headquarters, Hygienic Laboratory, Washington, D. C.]

Surg. T. Clark, in charge.
Asst. Surg. G. A. Kempf.

INDUSTRIAL HYGIENE.

[Headquarters, Marine Hospital, Pittsburgh, Pa.]

Surg. J. W. Schereschewsky, in charge.
Passed Asst. Surg. Robert Oleson, Room 312, Government Building, Milwaukee, Wis.
Passed Asst. Surg. J. A. Watkins.
Asst. Physicist Davis H. Tuck.
Sanitary Chemist C. Weisman.

MINE SANITATION.

Passed Asst. Surg. A. J. Lanza, Post Office Building, Butte, Mont.

INDUSTRIAL HYGIENE WITH REFERENCE TO HEALTH INSURANCE.

Surg. B. S. Warren.

COOPERATION WITH BUREAU OF CHEMISTRY IN ENFORCING PURE FOOD AND DRUGS ACT.

Surg. M. W. Glover.

COOPERATION WITH OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING.

Passed Asst. Surg. W. F. Draper.

Plague-eradicative measures.—The following officers were detailed for duty in plague-eradicative measures in the State of Louisiana, California, and Washington:

LOUISIANA.

Passed Asst. Surg. F. Simpson, in charge.
Passed Asst. Surg. C. L. Williams, in charge of laboratory.

Officers in charge of districts.

Asst. Surg. J. H. Smith, Jr.
Asst. Surg J. B. Laughlin.
Asst. Surg. H. C. Cody.
Asst. Surg. C. V. Akin.
Asst. Surg. W. C. Teufel.
Acting Asst Surg. M. D. Hollis.

LOUISIANA—Continued.

Acting Asst. Surg. Percy Ahrons.
Acting Asst. Surg. Park Howell.

CALIFORNIA.

Senior Surg. C. C. Pierce, in charge.
Surg. J. S. Boggess.

WASHINGTON.

Surg. B. J. Lloyd, in charge.
Passed Asst. Surg. E. Krulish.
Sanitary Engineer W. D. Wrightson.

Public-health laboratories were established at different stations of the service for the prevention of the interstate spread of disease, and the carrying out of sanitary measures, as follows:

ELLIS ISLAND, N. Y.

Surg. C. H. Lavinder, in charge.

FISHERMANS ISLAND, VA.

Surg. H. S. Cumming, in charge.

PITTSBURGH, PA.

Marine Hospital.

Surg. J. W. Schereschewsky, in charge.

CINCINNATI, OHIO.

Third and Kilgour Streets.

Passed Asst. Surg. W. H. Frost, in charge.

CHICAGO, ILL.

Marine Hospital.

Surg. J. O. Cobb, in charge.
Sanitary Engineer H. P. Letton.

ST. LOUIS, MO.

Marine Hospital.

Surg. M. J. White, in charge.

SAVANNAH, GA.

Marine Hospital.

Passed Asst. Surg. J. R. Ridlon, in charge.

NEW ORLEANS, LA.

Marine Hospital.

Surg. R. H. von Ezdorf, in charge.

163 Dryades Street (Plague).

Passed Asst. Surg. C. L. Williams, in charge.

FORT STANTON, N. MEX.

Surg. F. C. Smith, in charge.

SEATTLE, WASH.

No. 416 Central Building.

Surg. B. J. Lloyd, in charge.

SAN FRANCISCO, CAL.

Army and De Haro Streets (Plague).

Senior Surg. C. C. Pierce, in charge.

HONOLULU, HAWAII.

Surg. F. E. Trotter, in charge.

Prevention of introduction typhus fever from Mexico.—The following officers were detailed for duty in the prevention of the introduction of typhus fever from Mexico:

Surg. B. J. Lloyd, in charge, El Paso, Tex.
Asst. Surg. E. W. Scott, Laredo, Tex.
Acting Asst. Surg. J. W. Tappan, El Paso, Tex.
Acting Asst. Surg. H. B. Ross, Del Rio, Tex.
Acting Asst. Surg. Lea Hume, Eagle Pass, Tex.
Acting Asst. Surg. H. J. Hamilton, Laredo, Tex.
Acting Asst. Surg. J. H. Hunter, Rio Grande City, Tex.
Acting Asst. Surg. W. P. Woodall, Hidalgo, Tex.
Acting Asst. Surg. G. D. Fairbanks, Brownsville, Tex.
Acting Asst. Surg. A. L. Gustetter, Nogales, Ariz.
Acting Asst. Surg. B. C. Tarbell, Naco, Ariz.
Acting Asst. Surg. E. W. Adamson, Douglas, Ariz.

Personnel, Hygienic Laboratory.—At the close of the fiscal year there were on duty in the Hygienic Laboratory, in addition to the director and assistant director, 3 chiefs of division, 8 surgeons, 2 passed assistant surgeons, 1 assistant surgeon, 2 pharmacists, 1 artist, 6 technical assistants, 3 sanitary bacteriologists, 1 organic chemist, 1 sanitary chemist, 1 sanitary engineer, and 34 attendants.

Quarantine inspector.—One quarantine inspector served throughout the entire year.

Acting assistant surgeons.—The services of 8 acting assistant surgeons have been discontinued during the fiscal year, 4 have died, and 21 have been appointed, leaving on duty at the end of the fiscal year 250 such officers. In addition to this number, 63 physicians have been employed locally for the medical relief of superintendents, keepers, and surfmen of the United States Coast Guard, and 5 acting assistant surgeons have been continued for the physical examination of these employees.

Medical inspectors.—One female inspector served during the entire year for the inspection of women passengers at Honolulu, Hawaii.

Internes.—At the beginning of the fiscal year, there were 21 interns on duty at the various marine hospital stations, 28 were appointed, and 30 were separated from the service by reason of resignation, leaving 19 on duty at the close of the fiscal year.

Pharmacists.—At the beginning of the fiscal year there were on duty 50 pharmacists, divided as follows: Pharmacists of the first class, 27; second class, 15; third class, 8. One pharmacist of the third class was appointed and 1 resigned. One pharmacist of the second class and 2 of the third class were promoted, leaving at the close of the fiscal year 50 pharmacists on duty, as follows: Pharmacists of the first class, 28; second class, 16; third class, 6.

Pilots and marine engineers.—At the beginning of the fiscal year there were on duty 17 pilots and 20 engineers; 3 pilots resigned and 2 were appointed; 4 marine engineers resigned and 1 was appointed. The number on duty at the close of the fiscal year was as follows: Pilots, 16; marine engineers, 17.

Hospital and quarantine attendants.—At the beginning of the fiscal year 1,418 attendants were employed at the various marine hospitals, quarantine stations, and on epidemic duty, including 65 such employees on duty in the Philippine Islands, and at the close of the fiscal year there were so employed, as follows:

Marine hospitals	572
Quarantine (including Porto Rico and Hawaii)	259
Epidemic	437
Field investigations of public health	87
	1, 355
Philippine Islands	65
Total	1, 420

Recapitulation.

Commissioned medical officers	187
Chiefs of divisions, Hygienic Laboratory	3
Advisory board, Hygienic Laboratory	5
Artist	1
Technical assistants	12
Quarantine inspector	1
Acting assistant surgeons	255
Medical inspector	1
Collaborating epidemiologists	10
Physicians employed	63
Internes	19
Pharmacists	50
Pilots	16
Marine engineers	17
Chaplain	1
Expert farmer	1
Trained nurses	10
Technical employees, field investigations	59
Attendants	1, 420
Total	2, 131

BOARDS CONVENED.

Forty-five boards were convened at different times and at various stations through the United States for the physical examination of officers of the Coast Guard and applicants for entrance therein, 9 for the physical examination of detained aliens, 12 for the examination of commissioned officers to determine their fitness for promotion to the next higher grades of the service, 15 for examination of applicants for appointment as assistant surgeons, and 6 for the examination of pharmacists to determine their fitness for promotion to a higher grade.

The bureau sanitary board has been convened in 20 sessions to pass upon reports of inspections of establishments engaged in the manufacture of vaccines, serums, toxins, etc., prior to recommending a license, and to pass upon advertised remedies and appliances to determine if said advertisements should be excluded from the mails.

Two boards were convened under paragraph 56 of the service regulations for the physical examination of an officer of the service.

MISCELLANEOUS DIVISION.

PUBLICATIONS.

The fiscal year 1916 witnessed material increases in the distribution of service literature. The demand for publications of the service exceeded that for any previous year. This growing interest in public-health literature, a corollary of the extension of service activities, serves to emphasize the fact that the work of the service is becoming better known to health officers, local organizations, and private citizens throughout the country. The editions during the past year were somewhat larger than in years previous, making possible the compliance with more requests for literature. It is nevertheless to be regretted that in many instances it was necessary to refer correspondents to the Public Printer for sales copies, because the bureau's editions are still too small to adequately meet all requests. The extent to which the bureau was compelled to adopt this course is shown by the fact that the Public Printer sold during the fiscal year approximately 35,000 copies of documents of this service, at a total cost of over $1,000.

During the fiscal year just ended 132 publications, dealing with many phases of public health and sanitation, were issued in editions aggregating 2,241,225 copies. This number shows an increase over the fiscal year 1915 of approximately 512,725 copies. The cost of printing publications for the year totaled $67,503.60.

The publications of the service are divided into two general classes. The first class includes those of a technical nature and are usually issued as Hygienic Laboratory bulletins. These bulletins are not of general interest to the public because of their highly technical nature, and are therefore distributed almost exclusively to libraries, scientists, physicians, and others whose special duties require the assistance of literature of this nature. This class of publications is limited by law with regard to the size of each edition and the number of separate bulletins which can be issued during the course of a year.

In the second class of service publications are comprised the remaining publications of the service, which are of a more popular type and designed for the public at large and for the information and guidance of health officers charged with the duty of preserving the health of their respective communities. It is with reference to this second series of documents especially that the bureau feels the lack of sufficient editions to meet the increasing demands.

The general character of the publications issued during the year just ended will be seen more in detail from the following list, arranged by series.

ANNUAL REPORTS.

This report contains a concise but thorough summary of the operations of the Public Health Service for the year, outlining the activities of the service in its various fields of work.

HYGIENIC LABORATORY BULLETINS.

The bulletins of this series are technical in nature and consequently are distributed only to those showing a need for them, such as laboratories, libraries, and technical workers engaged in research work. During the fiscal year there were issued in this series bulletins as follows:

101. 1. **Complement Fixation in Tuberculosis.** By A. M. Stimson.
    2. **Report of an Investigation of Diphtheria Carriers.** By Joseph Goldberger, C. L. Williams, and F. W. Hachtel.
    3. **The Excretion of Thymol in the Urine.** By Atherton Seidell.
    4. **The Sterilization of Dental Instruments.** By H. E. Hasseltine.
    5. **A Modification of Rose's Method for the Estimation of Pepsin.** By Maurice H. Givens.

1. In this article the literature on the subject of complement fixation as applied to tuberculosis is analyzed and original work reported. Although the test is inconstant, positive results with certain antigens appear to be highly specific and a field for the test especially in institutional work is anticipated. The value of repeated tests in the same individual is emphasized, and consecutively negative results in apparently cured or arrested cases are interpreted as corroborative of the clinical findings.

2. In this paper the cultural findings with respect to the diphtheria bacillus in over 400 apparently healthy people are recorded. The examinations were made shortly after a time of greatly increased prevalence of diphtheria, with the object of determining how great a proportion of the population had become carriers. Nearly 1 per cent were found to harbor organisms morphologically diphtheria bacilli, but virulence could be demonstrated in only a small proportion of the cultures tested. The Hoffman bacillus was found in over 40 per cent of individuals. The advantage of taking cultures from the nose is emphasized.

3. A method for determining quantitatively the thymol content of the urine after administration of the drug is described in this article. Taken in conjunction with a similar analysis of the feces, the results of applying this test indicate that from one-half to two-thirds of the thymol administered is destroyed or fixed in the body. These facts are valuable in considering advantageous substitutes for thymol in the treatment of hookworm disease.

4. It has been recognized by dentists throughout the country that some efficient means for the sterilization of dental instruments should be devised and with this object in view the officials of several dental societies asked the Surgeon General of the Public Health Service to work out in detail a method for sterilizing dental instruments and appliances. As a result of this request the laboratory undertook an extensive series of experiments with this end in view. A simple sterilizing apparatus was devised by the use of which the various instruments used in the dental profession may be quickly and effi-

ciently sterilized. The paper also makes suggestions as to dental hygiene. A wide demand for this bulletin among dentists has been shown.

5. The fifth article describes a modification of Rose's method for estimation of pepsin.

102. 1. **Digitalis Standardization.** The Physiological Evaluation of Fat-Free Digitalis and Commercial Digitalis. By George Roth.
   2. **Preliminary Observations of Metabolism in Pellagra.** By Andrew Hunter, Maurice H. Givens, and Robert C. Lewis.

1. The necessity for satisfactory standardization of digitalis preparations has long been recognized, and with the object of devising a satisfactory standard, an extensive series of investigations has been carried on in the division of pharmacology. The results are contained in the first paper of this bulletin.

2. The second article gives the results of certain observations of metabolism in pellagra, which constitute valuable additions to the bulk of evidence on the subject from which one day statistical conclusions can be derived.

103. 1. **Chemical Changes in the Central Nervous System as a Result of Restricted Vegetable Diet.** By Mathilde L. Koch and Carl Voegtlin.
   2. **Chemical Changes in the Central Nervous System in Pellagra.** By Mathilde L. Koch and Carl Voegtlin.

The two papers in this bulletin compare the chemical changes in the nervous system resulting from restricted vegetable diets, with those observed in pellagra. Certain points of close resemblance are demonstrable by chemical examination. In pellagra the changes are most marked in the spinal cord and principally involve certain lipoids.

104. **Investigation of the Pollution and Sanitary Conditions of the Potomac Watershed.** With special reference to Self-Purification and the Sanitary Condition of Shellfish in the Lower Potomac. By Hugh S. Cumming; Plankton Studies by W. C. Purdy and Hydrographic Studies by Homer P. Ritter.

This bulletin records the results of one of a series of investigations made and contemplated by the Service, the chief object of which is to determine the sanitary features of various interstate streams of different types both physically and in relation to the population and human activities on their basins. When general facts applying to streams of a given type have been determined, the work of ascertaining the sanitary condition of other streams of the same type is much facilitated.

The Potomac River really represents two very different types of stream; the one relatively rapidly flowing, traversing mountainous sparsely populated country, with nevertheless a considerable amount of manufacturing activity along its banks; and the other, represented by the lower portion, essentially a tidal estuary, having a large city with heavy crude sewage pollution at its head, and supporting a large shellfish industry in the lower saline reaches.

The bulletin records a sanitary survey of the upper watershed and the effects of the sewage and industrial pollution on the condition of the water at various sections. The most interesting feature of the lower river is the degree and manner of purification accomplished by natural agencies. The to-and-fro motion of the tides has the effect of greatly lengthening the time during which a given particle of water is subjected to the agencies inimical to pollution, so that before the shellfish bearing area is reached, the water has been restored to a good sanitary condition. The very few instances of pollution of oyster beds are traced to local conditions.

Incidentally, important contributions to the bacteriology and chemistry of water, to the methods of securing samples, and the flora and microscopic fauna of the river, having sanitary significance, are included. The text is well illustrated with maps, charts, diagrams, etc., and pictures of aquatic forms of life.

105. **Digest of Comments on the Pharmacopœia of the United States of America** and on the National Formulary. By Martin I. Wilbert.

This bulletin is a continuation of previous digests of comments and brings the work up to December 31, 1914. Previous bulletins along this line have been in great demand.

PUBLIC-HEALTH BULLETINS.

These bulletins are less technical in character than the preceding series. In fact, many of them are popular in style and prove very useful in connection with the vigorous campaigns for rural sanitation being carried on by the service in the Southern States. However, generally speaking, and especially with regard to the compilations of State laws on various subjects, these bulletins are found extremely valuable by health officers and officials who are charged with the duty of combating epidemics of disease. They frequently learn from these documents that the problems which trouble them have already been solved by other States, and avail themselves of the example of salutary legislation by which the desired result is accomplished. An accurate idea of these documents can be best obtained by reference to the following list issued during the last fiscal year:

71. **Studies in Vocational Diseases.** I. The Health of Garment Workers. By J. W. Schereschewsky. II. The Hygienic Conditions of Illumination in Workshops of the Women's Garment Industry. By J. W. Schereschewsky and D. H. Tuck.

This bulletin reports a comprehensive investigation of the health of workers in the cloak and suit, and dress and waist industries in New York City and of the hygienic conditions under which they work. The scope and results of this investigation were described in the last annual report, pages 46–49.

72. **Transactions of the Thirteenth Annual Conference of State and Territorial Health Officers with the United States Public Health Service,** Washington, May 13, 1915.

The following subjects were taken up at the conference: Interstate Quarantine Regulations, morbidity reports, pollution of navigable waters, malaria, sanitation of public conveyances, transportation of tuberculous persons, rural sanitation, pellagra, sickness insurance, and leprosy.

73. **Tuberculosis Among Industrial Workers.** Report of an investigation made in Cincinnati, with special reference to predisposing causes. By D. E. Robinson and J. G. Wilson. 143 pages.

The investigation here reported was described in the last annual report, pages 49–50. The study was not limited to the industries alone, but was extended into other fields in an attempt to determine the most important causes predisposing to the high mortality from tuberculosis.

74. **Investigation of the Pollution of Tidal Waters of Maryland and Virginia,** with special reference to shellfish-bearing areas. By Hugh S. Cumming.

This is the second comprehensive report on the pollution of coastal waters, the first having been published as Hygienic Laboratory Bulletin No. 104. The investigation here reported was described in the annual report for 1915, pages 108–110.

75. **Studies Upon Leprosy,** XXVIII–XXXIII. By G. W. McCoy, H. T. Hollmann, W. J. Goodhue, M. T. Clegg.

The results of investigations made at the leprosy investigation station, Hawaii, are presented in these six papers. They comprise articles on the chaulmoogra oil treatment of leprosy, carbon dioxide snow in the treatment of leprosy, *B. Lepræ* in the circulating blood of lepers, leprosy in a nineteen months old child, the cultivation of a nonchromogenic acid-fast bacillus from a case of nodular leprosy, and a note concerning the favorable influence of glucose on the growth of acid-fasts.

76. **Health Insurance.** Its relation to the public health. By B. S. Warren and Edgar Sydenstricker.

This bulletin deals with the prevalence and cost of sickness among wageworkers, the conditions causing it, the responsibility for those conditions, and the need of cooperative action for relief and prevention. A scheme of health insurance is proposed and discussed.

PUBLIC HEALTH REPORTS.

These reports are issued on Friday of each week, and in accordance with law are distributed to "health officers," "collectors of customs," and "other sanitarians." It is in these weekly reports that the health officers of the country find much of their best material for safeguarding the health of their respective communities. The reports contain each week statistics on the prevalence of disease throughout this and foreign countries, together with sanitary legislation enacted by States and municipalities to meet these diseases and insanitary conditions and court decisions construing various laws, State and national, relating to public health. The weekly editions during the past year reached a maximum of 15,650 copies.

REPRINTS FROM THE PUBLIC HEALTH REPORTS.

The reprints are "separates" of leading articles appearing each week in the Public Health Reports. By reissuing them as separates in pamphlet form, it becomes possible to distribute them in large quantities at comparatively small expense and thus reach a very large number of readers who do not receive the weekly Public Health Reports. The value of these "reprints" to the public will become evident from a reading of the following list of titles of those issued last year:

285. **The Model State Law for Morbidity Reports.** As amended by the thirteenth annual conference of State and territorial health authorities with the United States Public Health Service, Washington, May 13, 1915. July 2, 1915.

286. **Zooparasitic Intestinal Infections.** An analysis of infections found among 1,287 school children (776 white, 511 negro) of the city of X. By C. W. Stiles. July 2, 1915.
287. **The Practical Use of Disinfectants.** By H. E. Hasseltine. July 2, 1915.
288. **Intestinal Infections.** The school grades attained by 2,166 white school children (1,062 boys, 1,104 girls) in the city of X, classified by age, sanitation, and intestinal parasites. By C. W. Stiles. July 2, 1915.
289. **Post-Vaccination.** Studies on its relation to vaccine virus. By John F. Anderson. July 16, 1915.
290. **Anopheles as a Winter Carrier of Plasmodium.** The mosquito as a prophylactic indicator. By M. Bruin Mitzmain. July 16, 1915.
291. **The Notifiable Diseases.** Prevalence during 1914 in cities of over 100,000. Diphtheria, gonorrhea, leprosy, malaria, measles, epidemic cerebrospinal miningitis, poliomyelitis, rabies, scarlet fever, smallpox, syphilis, tuberculosis, and typhoid fever. Cases reported, case rates per 1,000 population, and fatality rates per 100 cases. July 23, 1915.
292. **Embalming.** Indefinite preservation of the body. By Edward Francis. July 30, 1915.
293. **Methods of Destroying Lice.** Abstract of article by J. Parlane Kinloch, M. D. August 6, 1915.
294. **The Number and Kind of Drug Addicts.** By Martin I. Wilbert. August 6, 1915.
295. **Standard for Determining the Purity of Milk.** The limit of error in bacteriological milk analyses. By H. W. Conn, Wesleyan University, Middletown, Conn. August 13, 1915.
296. **The Trachoma Problem.** By J. W. Kerr. August 20, 1915.
297. **The Pharmacy of Useful Drugs.** By Martin I. Wilbert. August 27, 1915.
298. **The Notifiable Diseases.** Reported prevalence during 1914 by States. Dengue, diphtheria, gonorrhea, leprosy, malaria, measles, epidemic cerebrospinal meningitis, poliomyelitis, rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tuberculosis, typhoid fever, and typhus fever. Cases reported, indicated case rates per 1,000 population and indicated fatality rates per 100 cases. September 3, 1915.
299. **Essentials of Swimming-Pool Sanitation.** By Wallace A. Manheimer, Ph. D. September 17, 1915.
300. **Public Health Administration in Chicago, Ill.** A study of the organization and administration of the city health department. By J. C. Perry. August 20–September 24, 1915.
301. **Tobacco and Snuff:** Their use by white school children in the city of X. By C. W. Stiles and D. N. Richards. October 1, 1915.
302. **Industrial Hygiene.** A plan for education in the avoidance of occupational diseases and injuries. By J. W. Schereschewsky. October 1, 1915.
303. **Heights and Weights of Children.** Classification, by age and by sanitation, of 1,652 white school children (771 boys, 881 girls) in the city of X. By C. W. Stiles and George A. Wheeler. October 8, 1915.
304. **An Efficient Liquid Disinfectant.** A formula by which one can be readily prepared. By Albert F. Stevenson. October 8, 1915.
305. **Cosmetics as Drugs.** A review of some of the reported harmful effects of the ordinary constituents of widely used cosmetics. By Martin I. Wilbert. October 15, 1915.
306. **Lung Capacity of Children.** Spirometer tests of 1,618 white school children (751 boys, 867 girls) in the city of X. By C. W. Stiles and Floyd Graves. October 15, 1915.
307. **The Prevention of Pellagra.** A test of diet among institutional inmates. By Joseph Goldberger, C. H. Waring, and David G. Willets. October 22, 1915.
308. **The Prevalence of Pellagra.** Its possible relation to the rise in the cost of food. By Edgar Sydenstricker. October 22, 1915.
309. **Tuberculosis:** With special reference to its epidemiology transmissibility and prevention. By George M. Kober, M. D. October 29, 1915.
310. **The Division of Sanitary Reports and Statistics.** Bureau of the Public Health Service. November 5, 1915.
311. **Experimental Pellagra in the Human Subject Brought About by a Restricted Diet.** By Joseph Goldberger and G. A. Wheeler. November 12, 1915.

312. **The Notifiable Diseases.** Prevalence during 1914 in cities of 10,000 to 100,000. Diphtheria, gonorrhea, leprosy, malaria, measles, epidemic cerebrospinal meningitis, poliomyelitis, scarlet fever, smallpox, syphilis, tuberculosis, and typhoid fever. Cases reported, case rates per 1,000 population, and fatality rates per 100 cases. November 19, 1915.
313. **Hydrocyanic Acid Gas.** Its practical use as a routine fumigant. By R. H. Creel, F. M. Faget, and W. D. Wrightson. December 3, 1915.
314. **Strychnine Sulphate.** Its effect on California valley quail. By C. C. Pierce and M. T. Clegg. December 10, 1915.
315. **Public Health Administration in North Dakota.** By Carroll Fox. December 17, 1915.
316. **Memory Tests of School Children.** Memory span of 1,585 white school children (751 boys, 834 girls) in the city of X. By C. W. Stiles. December 24, 1915.
317. **Public Health Administration in Nevada.** By Carroll Fox. December 31, 1915.
318. **Standards for Milk.** Their necessity to the welfare of the dairy industry. By John F. Anderson. January 7, 1916.
319. **The Practicing Physician.** What he should know about the registration of births and deaths and the reporting of sickness. By J. W. Trask. January 14, 1915.
320. **Pyorrhea Alveolaris.** Preliminary report on treatment with ipecac and emetin hydrochloride. By John S. Ruoff. January 21, 1916.
321 **Narcotic Drugs.** Recent legislation designed to restrict their use. By M. I. Wilbert. January 21, 1916.
322. **Mental Manifestations of Pellagra.** By W. F. Lorenz. February 4, 1916.
323. **Morbidity Registration in the United States.** A suggestion as to the formation of a provisional registration area for morbidity. By John S. Fulton and John S. Fulton, jr., February 11, 1916.
324. **Anopheles Punctipennis Say.** Its relation to the transmission of malaria. Report of experimental data relative to subtertian malarial fever. By M. Bruin Mitzmain. February 11, 1916.
325. **Vitamines and Nutritional Diseases.** A stable form of vitamine, efficient in the prevention and cure of certain nutritional deficiency diseases. By Atherton Seidell. February 18, 1916.
326. **Community Sickness Survey.** Rochester, N. Y., September, 1915. By Lee K. Frankel, Ph. D., and Louis I. Dublin. February 25, 1916.
327. **Rocky Mountain Spotted Fever.** A report of laboratory investigations of the virus. By L. D. Fricks. March 3, 1916.
328. **Demonstrations of Malarial Control.** By R. H. von Ezdorf. March 10, 1916.
329. **Death Rates of the Colored Population.** Their trend and significance in the United States. By John W. Trask. March 17, 1916.
330. **Poisons and Habit-Forming Drugs.** A digest of laws and regulations relating to the possession, use, sale, and manufacture of poisons and habit-forming drugs enacted during 1914 and 1915, now in force in the United States. By Martin I. Wilbert. February 18 to March 24, 1916.
331. **Endemic Index of Malaria in the United States.** By R. H. von Ezdorf. March 31, 1916.
332. **The Notifiable Diseases.** Diseases and conditions required to be reported in the several States.
333. **Bread as a Food.** Changes in its vitamine content and nutritive value with reference to the occurrence of pellagra. By Carl Voegtlin, M. X. Sullivan, C. N. Myers. April 14, 1916.
334. **Biological Products.** Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. April 14, 1916.
335. **Statistics of Disability.** A compilation of some of the data available in the United States. By B. S. Warren and Edgar Sydenstricker. April 21, 1916.
336. **Some Fallacies Regarding Phenol.** A review with reports of observations on the influence of ethyl alcohol on the germicidal and on the toxic properties of phenol. By Martin I. Wilbert. April 28, 1916.
337. **Tertian Malarial Fever.** Transmission experiments with anopheles punctipennis. By M. Bruin Mitzmain. May 12, 1916.

338. **State Laws and Regulations Pertaining to Public Health.** Adopted during the year 1915. Published in Public Health Reports during 1915 and 1916.
339. **Pellagra.** Laboratory examinations in connection with the disease. By J. R. Ridlon. May 19, 1916.
340. **Public Health Administration in Florida.** By Carroll Fox. June 2, 1916.
341. **Health of Garment Workers.** The relation of economic status to health. By B. S. Warren and Edgar Sydenstricker. With introduction by J. W. Schereschewsky. May 26, 1916.
342. **Court Decisions Pertaining to the Public Health.** Published in the Public Health Reports previous to January 1, 1916.

SUPPLEMENTS TO THE PUBLIC HEALTH REPORTS.

These publications do not form a part of the Public Health Reports, nor are they sent out therewith. They are popular in style and treat of various health subjects of interest to the general public. The large demand for copies of these supplements attests their value and interest to the general public. The following were issued during the fiscal year:

23. **Typhoid Fever.** A report of a water-borne outbreak in Decatur and in New Decatur, Ala. By Paul Preble. May 7, 1914.
24. **Exercise and Health.** By F. C. Smith. May 7, 1915.
25. **School Hygiene.** Survey of schools in Manatee County, Fla. By J. A. Nydegger. July 30, 1915.
26. **Public Health Administration in Richmond, Ind.** A report of a survey to determine the incidence of tuberculosis. By J. C. Perry. October 8, 1915.
27. **United States Public Health Service Exhibit at the Panama-Pacific International Exposition,** San Francisco, 1915. By W. C. Rucker and C. C. Pierce. December 31, 1915.
28. **Rocky Mountain Spotted Fever.** Some points in its diagnosis and prevention. By L. D. Fricks. March 17, 1916.
29. **The Transmission of Disease by Flies.** By Earnest A. Sweet. April 14, 1916.

MISCELLANEOUS PUBLICATIONS.

In this series are published those documents of this service which can not properly be classified in any of the preceding series. Last year there were issued under this head the following:

12. **List of Publications, Public Health Service.** July, 1916.

LIBRARY.

During the course of the fiscal year the bureau library received many valuable donations, which, with the volumes obtained by purchase, materially improved its character as a public health library. In addition to these volumes, the bureau was kept advised of the current advance of the medical profession by subscriptions to 42 journals, many of which have been bound and placed in the library.

NEEDS OF THE SERVICE.

Study and prevention of pellagra.—The results of scientific studies of pellagra conducted by the service during the past year have been notable, and the public health and economic value of this work alone will be many times greater than the entire cost of investigations of health matters during the year. As outlined in another portion of this report, experimental work has determined both a cause and a method of prevention of this disease, which within the past few years has become alarmingly prevalent in certain sections. There is need of extending this work to demonstrate the value of these results and to make further investigations as to the relation of pellagra prevalence and economic conditions in badly affected communities.

Rural sanitation.—One of the most important phases of service activity during the year has been the study of sanitary conditions in rural communities. In the counties selected for this work, marked betterment in sanitary conditions, with resulting decreases in the number of cases of illness from diseases due to insanitary surroundings, has invariably been accomplished. When it is considered that 53.7 per cent of the population of the United States is classed as rural, which includes towns and villages of less than 2,500 inhabitants, and that very few of these people have the sanitary safeguards in the way of protected water supplies and sewage-disposal systems afforded the urban dweller, it becomes clear that improvement in rural health conditions must be brought about largely by encouraging the individual along lines of sanitary progress. During the progress of these studies every home in the selected counties has been visited, sanitary surroundings observed, and advice offered wherever needed. Literature on communicable diseases has been distributed, public meetings have been held, and addresses made. The work has in all cases been conducted in cooperation with State and local health authorities, and the enthusiastic response on the part of the general public has been most gratifying. Effective work has thus been done in reducing typhoid fever, malaria, and other diseases of high incidence in rural communities, and it is believed that adequate provision should be made for extending this work to at least one or two representative counties in every State of the Union.

Industrial hygiene.—The investigations of sanitary conditions in certain industries such as have been carried out by the service in New York, Massachusetts, Ohio, Pennsylvania, and Wisconsin have done much to determine sanitary defects in the industries studied, and to suggest remedial measures applicable to such industries generally. This work has also been done in cooperation with State and local authorities. There are many problems connected with industrial sanitation which await solution, which are of Nation-wide extent and significance, and which should therefore be investigated by the National Government. It is hoped that appropriations will be provided for the commencement of studies which have been planned.

Biologic products.—During the year Congress appropriated $10,000 for the enforcement of the act of July 1, 1902, which provides for the regulation of the manufacture and sale of viruses, serums, toxins, and analogous products. At the time of the passage of this law there were but 12 establishments engaged in the manufacture of these products. Since then the use of viruses, serums, and toxins in the prevention and cure of disease has increased to such an extent that in 1915 there were 41 licensed establishments in this country and abroad, and over 60 different products propagated therein. It is highly important to the public health that the preparation of these products be closely supervised, in order that their purity and potency may be safeguarded. More frequent inspections of the establishments and the purchase of a greater number of samples of their products for examination are extremely necessary, and it is hoped that this appropriation will be increased.

National quarantine.—During the past year Congress appropriated $150,000 for the purchase of the quarantine station owned by the city of Boston, which station had been conducted by the service under a lease since June 1, 1915. This leaves but two important stations which are not a part of the national quarantine system, i. e., those located at New York and at Baltimore. At present a service officer, on leave, is acting as health officer of the port of New York under appointment from the governor of the State, and at its last session the General Assembly of the State of New York passed a resolution authorizing the appointment of a commission to negotiate for the transfer of the New York quarantine station to the Federal Government. The city council of Baltimore has also recently signified its desire to transfer the quarantine function at that city to the National Government.

In former reports the many advantages of a complete system of national quarantine have been set forth. It is believed that present sanitary conditions throughout the world render doubly important the acquisition of these remaining locally administered stations at the earliest practicable time. At no time in recent years have plague, cholera, and typhus prevailed in such widely scattered territory as they do to-day. The European situation has interfered with effective sanitary administration, and national and international complications in Europe and elsewhere have disrupted the interchange of information as to the prevalence of epidemic diseases. It is also likely that the close of the European war will bring about a quickening of commercial intercourse and an increased tide of immigration, necessitating the greatest vigilance in the administration of maritime quarantine.

National care of lepers.—For several years past it has become increasingly apparent that some provision should be made for the care of lepers by the Federal Government. This question was discussed in the Annual Report of the Public Health Service for the fiscal year 1914, and again in 1915. A bill providing for a home for lepers was introduced in the Sixty-third Congress, but failed of passage. In the first session of the Sixty-fourth Congress a bill (H. R. 193) "To provide for the care and treatment of persons afflicted with leprosy and to prevent the spread of leprosy in the United States" was passed by the House of Representatives on May 4, 1916. A similar bill (S. 4086) has been favorably reported to the Senate by the Committee on Public Health and National Quarantine. It is hoped that this important measure will be enacted into law, and a means thus afforded for segregating these unfortunates, many of whom by the very nature of their affliction are forced to become wanderers from place to place, and are therefore a menace to the public health.

Additional building for the Hygienic Laboratory.—Efforts to secure an additional building for the Hygienic Laboratory, made for several years past, having proven unsuccessful, it is desired to again invite attention to the importance of providing adequate quarters for this institution. The expansion of the work of the laboratory has kept pace with the increased activities of the service in the field. The personnel has been increased as the work necessitated, and this has resulted in a condition of overcrowding which seriously interferes with important scientific work. An estimate of $175,000 for an additional building has again been submitted, and it is hoped that favorable action will be taken on this very urgent need.

Bureau personnel.—Increases in the clerical force of the bureau have been made from time to time within the past several years, but have not been sufficient to handle efficiently the growing volume of work. Overtime work has been necessary on numerous occasions, and much additional work that could have been undertaken has been postponed. Estimates submitted to Congress for the next fiscal year include several additional employees. These estimates have, however, been held to the lowest minimum consistent with actual needs, and their favorable consideration is earnestly urged.

Publications.—Although the number of publications distributed during the past year was considerably larger than in 1915, it was impossible to comply with many requests for literature on public-health subjects because of the limited size of editions. The increasing demand for printed information on health topics evidences the growing interest and activity of the public along such lines. It is believed that in no way can the Federal Government more effectively encourage this tendency than by endeavoring to supply every request for such information. The good accomplished in this manner should be worth many times the increased cost of printing.

Repairs to annex of Butler Building.—An estimate has been submitted for the remodeling of the one-story annex to the Butler Building, which provides for the erection of an additional story and improvements to the walls and interior. This additional space is greatly needed for the working force of the bureau, and for the purpose of accommodating the steadily growing library. It has been necessary to erect shelves in the hallways for books, and the library of the bureau, containing many valuable reference books and reports, is separated in several divisions and on several floors of the building. The improvements covered by the estimate would render available a considerable amount of additional space at a moderate cost.

Rupert Blue,
Surgeon General.

APPENDIX.

FINANCIAL STATEMENT.

Receipts and expenditures, Public Health Service, for the fiscal year ended June 30, 1916.

APPROPRIATION: "PUBLIC HEALTH SERVICE, 1916."

Subheads of appropriations.	Appropriations and repayments.	Expenditures.	Balance, June 30, 1916.
Pay, etc., commissioned officers and pharmacists	$695,000.00	$683,621.36	$11,378.64
Pay of acting assistant surgeons	200,000.00	187,980.81	12,019.19
Pay of other employees	502,606.00	491,943.29	10,662.71
Freight, transportation, etc	30,000.00	27,657.58	2,342.42
Fuel, light, and water (appropriation $75,000)	75,011.30	74,403.76	607.54
Furniture, etc	8,000.00	7,973.34	26.66
Purveying depot supplies (appropriation $45,000)	50,000.36	49,961.68	38.68
Maintenance Hygienic Laboratory	20,000.00	19,982.36	17.64
Maintenance marine hospitals (appropriation $256,000)	269,050.09	266,739.76	2,310.33
Care of seamen, etc. (appropriation $170,000)	174,005.83	143,234.78	30,771.05
Books	500.00	496.37	3.63
Disbursements		[1] 1,926,819.86	
Encumbrances		27,175.23	
Total (appropriation $2,002,106)	2,024,173.58	1,953,995.09	70,178.49

[1] Includes $1,400 transferred to "Contingent expenses, Treasury Department, stationery, 1916."

NOTE.—For expenditures by stations under marine hospitals and relief, see Statistical Table 2.

APPROPRIATION: "PREVENTING THE SPREAD OF EPIDEMIC DISEASES, 1916."

Amount of appropriation		$500,000.00
Repayments		1,014.40
Total		501,014.40
Expenditures:		
Disbursements	[1] $468,319.84	
Encumbrances	1,795.75	
As follows—		
Plague eradicative measures—		
Louisiana	312,081.32	
California	54,528.52	
Washington	10,396.30	
Prevention of trachoma—		
Kentucky	25,074.57	
Tennessee	879.77	
Virginia	6,148.65	
West Virginia	5,969.17	
Typhus fever prevention, Texas border	6,684.18	
Preventive measures—		
Boston quarantine	29,735.13	
Cuba	9,398.52	
China, England, Italy, etc	2,473.16	
Steamer *Murray*	1,850.16	
Travel	2,427.31	
Vaccine, telegrams, etc	2,468.83	
		470,115.59
Balance, June 30, 1916		30,898.81

[1] Includes $200 transferred to "Contingent expenses, Treasury Department, stationery, 1916."

NOTE.—Payments amounting to $91,106.42 were made from pay items of appropriation "Public Health Service, 1916," account of epidemic duty.

APPROPRIATION: "QUARANTINE SERVICE, 1916."

Amount of appropriation		$155,000.00
Repayments		3,279.71
Total		158,279.71
Expenditures:		
Disbursements	[1] $152,040.14	
Encumbrances	803.53	
		152,843.67
Balance June 30, 1916		5,436.04

Expenditures by stations.

Name of station.	Pay and allowances, officers and employees.[2]	Maintenance.	Total maintenance, pay, and allowances.
Alaska	$20.00		$20.00
Alexandria, Va	10.00		10.00
Beaufort, S. C	1,242.50	$275.95	1,518.45
Biscayne Bay, Fla	1,584.17		1,584.17
Boca Grande, Fla	1,958.34	621.87	2,580.21
Brunswick, Ga	2,333.50	1,498.87	3,832.37
Cape Charles, Va	6,842.50	7,039.63	13,882.13
Cape Fear, N. C	7,862.50	2,643.88	10,506.38
Cedar Keys, Fla	300.00		300.00
Charleston, S. C	8,437.50	1,665.90	10,103.40
Columbia River, Oreg	11,803.00	4,812.83	16,615.83
Coos Bay, Oreg		2.45	2.45
Cumberland Sound, Fla	3,180.00	84.00	3,264.00
Delaware Bay and River, Del	12,313.00	2,320.10	14,633.10
Delaware Breakwater, Del	4,286.67	1,751.58	6,038.25
Eagle Pass, Tex	1,855.00	38.36	1,893.36
Eastport, Me	1,230.00		1,230.00
El Paso, Tex		326.95	326.95
Eureka, Cal	360.00	40.00	400.00
Fort Bragg, Cal	20.00		20.00
Galveston, Tex	16,033.01	17,121.52	33,154.53
Georgetown, S. C	240.00	422.53	662.53
Gulf, Miss	7,595.78	4,067.22	11,663.00
Hawaii	30,727.84	11,988.63	42,716.47
Key West, Fla	4,133.00	1,051.51	5,184.51
Laredo, Tex	1,695.00	324.74	2,019.74
Miscellaneous	360.00	3,872.55	4,232.55
Mobile, Ala	10,107.88	7,982.33	18,090.21
Newbern, N. C	150.00		150.00
New Orleans, La	27,135.90	13,566.57	40,702.47
Pascagoula, Miss	800.00	52.17	852.17
Pensacola, Fla	7,462.17	6,669.50	14,131.67
Perth Amboy, N. J	1,558.33	1,274.68	2,833.01
Port Harford, Cal	520.00		520.00
Port Inglis, Fla	30.00	180.00	210.00
Portland, Me	8,190.01	2,014.75	10,204.76
Porto Rico	26,818.50	8,109.52	34,928.02
Port Royal, S. C	1,187.50	262.91	1,450.41
Port Townsend, Wash	15,136.56	3,521.43	18,657.99
Providence, R. I	8,318.00	3,165.85	11,483.85
Reedy Island, Del	4,358.83	2,773.07	7,131.90
St. Andrews, Fla	750.00	266.60	1,016.60
St. Georges Sound, Fla	2,467.50	423.45	2,890.95
St. Johns River, Fla	2,057.50	539.38	2,596.88
St. Joseph, Fla	120.00	84.00	204.00
San Diego, Cal	6,480.00	3,145.71	9,625.71
San Francisco, Cal	29,253.66	20,275.88	49,529.54
San Pedro, Cal	919.25	572.20	1,491.45
Santa Barbara, Cal	25.00		25.00
Savannah, Ga	8,160.67	5,715.36	13,876.03
Tampa Bay, Fla	7,644.99	6,426.22	14,071.21
Leprosy Hospital	16,400.75	3,851.02	20,251.77
Total	312,476.31	152,843.67	465,319.98

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[1] Includes $500 transferred to "Contingent expenses, Treasury Department, stationery, 1916."
[2] Paid from pay items appropriation "Public Health Service, 1916."

APPROPRIATION: "FIELD INVESTIGATIONS OF PUBLIC HEALTH, 1916."

Amount of appropriation		$200,000.00
Repayments		46.85
Total		200,046.85
Expenditures:		
Disbursements	[1] $189,155.30	
Encumbrances	3,857.54	
As follows:		
Rural sanitation	20,432.43	
Malaria	17,462.52	
Filariasis	2,549.35	
Pellagra	44,907.33	
Investigations navigable waters	38,965.40	
Pollution of coastal waters	16,705.48	
Sewage disposal	7,025.86	
Industrial wastes	19,215.72	
Public health organization and administration	2,717.31	
School hygiene	4,041.09	
Industrial hygiene	11,136.24	
Industrial hygiene (health insurance)	1,868.26	
Mine sanitation	650.86	
Sanitation of metallurgical plants	11.00	
Tuberculosis in Cincinnati industries	65.00	
Milk investigations	596.67	
Typhoid fever	1,661.61	
Pollution of streams	1,250.00	
Stationery, telegrams, etc	1,750.71	
		193,012.84
Balance June 30, 1916		7,034.01

NOTE.—Payments amounting to $38,477.88 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1916," on account of field investigations.

APPROPRIATION: "NATIONAL QUARANTINE AND SANITATION."

Balance July 1, 1915		$953.32
Add encumbrance overestimate		1,765.49
Available		2,718.81
Expenditures	$366.00	
Transferred to Supervising Architect	924.84	
		1,290.84
Balance June 30, 1916		1,427.97

APPROPRIATION: "INTERSTATE QUARANTINE SERVICE, 1916."

Amount of appropriation		$15,000.00
Expenditures:		
Disbursements	$14,919.22	
Encumbrances	79.31	
		14,998.53
Balance June 30, 1916		1.47

NOTE.—Payments amounting to $2,500 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1916," on account of interstate quarantine.

APPROPRIATION: "SPECIAL STUDIES OF PELLAGRA, PUBLIC HEALTH SERVICE, 1916."

Amount of appropriation		$40,000.00
Expenditures:		
Disbursements	$35,347.51	
Encumbrances	995.11	
		36,342.62
Balance June 30, 1916		3,657.38

NOTE.—Payments amounting to $7,158.67 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1916," on account of special studies of pellagra

APPROPRIATION: "STUDIES OF RURAL SANITATION, PUBLIC HEALTH SERVICE, 1916."

Amount of appropriation		$25,000.00
Expenditures:		
Disbursements	$24,870.37	
Encumbrances	65.20	
		24,935.57
Balance June 30, 1916		64.43

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[1] Includes $800 transferred to "Contingent expenses, Treasury Department, stationery, 1916."

NOTE.—Payments amounting to $3,199.91 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1916," on account of studies of rural sanitation.

APPROPRIATION: "RELIEF AND TRANSPORTATION OF AMERICAN CITIZENS IN MEXICO, PUBLIC HEALTH SERVICE."

Balance July 1, 1915	$574.28
Expenditures	9.00
Balance June 30, 1916	565.28

APPROPRIATION: "SALARIES, OFFICE OF SURGEON GENERAL, PUBLIC HEALTH SERVICE, 1916."

Amount of appropriation	$56,750.00
Expenditures	56,347.14
Balance June 30, 1916	402.86

CONSTRUCTION APPROPRIATIONS.

LEPROSY HOSPITAL, HAWAII.

Balance June 30, 1916 (act Mar. 3, 1905)	$16,956.35

MARINE HOSPITALS.

[Balances June 30, 1916.]

Cleveland, Ohio (act Mar. 4, 1909)	$100.00
Cleveland, Ohio (act Mar. 4, 1907)	374.95
Fort Stanton, N. Mex. (act Aug. 24, 1912)	3.20

QUARANTINE STATIONS.

[Balances June 30, 1916.]

Brunswick, Ga. (act June 25, 1910)	$1,708.87
Charleston, S. C. (act Mar. 4, 1909)	634.46
Columbia River (act June 25, 1910)	745.47
Delaware Breakwater (act Mar. 4, 1907)	857.00
Gulf (act Mar. 4, 1907)	353.35
Honolulu (act Mar. 4, 1907)	390.52
Pensacola (act Mar. 4, 1907)	18.02
Reedy Island (act Mar. 4. 1909)	66.71
San Francisco (act May 27, 1908)	180.75
San Francisco (act June 30, 1906)	1,511.71
Savannah (act Mar. 4, 1909)	410.85
Under Supervising Architect (amounts appropriated):	
Honolulu, Hawaii (act Mar. 4, 1915)	22,000.00
Portland, Me. (act Mar. 3, 1915)	23,620.00
Savannah, Ga. (act Mar. 4, 1915)	28,500.00

STATISTICAL TABLES.

TABLE 1.—*Comparative table of number of patients annually treated, 1868 to 1916.*

Fiscal year.	Sick and disabled seamen furnished relief.	Fiscal year.	Sick and disabled seamen furnished relief.
Prior to reorganization:		After reorganization—Continued.	
1868	11,535	1892	53,610
1869	11,356	1893	53,317
1870	10,560	1894	52,803
After reorganization:		1895	52,643
1871	14,256	1896	53,804
1872	13,156	1897	54,477
1873	13,529	1898	52,709
1874	14,356	1899	55,489
1875	15,009	1900	56,355
1876	16,808	1901	58,381
1877	15,175	1902	56,310
1878	18,223	1903	58,573
1879	20,922	1904	58,556
1880	24,860	1905	57,013
1881	32,613	1906	54,363
1882	36,184	1907	55,129
1883	40,195	1908	54,301
1884	44,761	1909	53,704
1885	41,714	1910	51,443
1886	43,822	1911	52,209
1887	45,314	1912	51,078
1888	48,203	1913	50,604
1889	49,518	1914	53,226
1890	50,671	1915	55,782
1891	52,992	1916	68,398

TABLE 2.—*Transactions at marine hospitals and other relief stations, fiscal year 1916.*

	Total number of patients treated.	Patients in hospital July 1, 1915.	Admitted during the year.	Total number treated in hospital.	Discharged.	Died.	Remaining in hospital June 30, 1916.	Number of days' relief in hospital.	Number of patients furnished office relief.	Number of times office relief was furnished.	Number persons examined physically, including pilots.	Number of foreign seamen treated.	Days hospital relief furnished foreign seamen.	Amount expended.
Total (first, second, third, and fourth class stations)	**68,458**	**1,190**	**16,334**	**17,524**	**15,797**	**474**	**1,253**	**484,408**	**50,934**	**97,263**	**37,985**	**467**	**6,843**	**$926,963.63**
First-class stations.														
Baltimore, Md	2,694	52	692	744	661	21	62	26,103	1,950	3,181	1,901	5	76	$42,622.04
Boston, Mass	2,351	56	624	680	600	19	61	23,798	1,671	2,732	1,621	....	....	43,052.22
Buffalo, N. Y	2,102	11	331	342	302	15	25	9,268	1,760	2,766	1,276	....	....	21,140.91
Chicago, Ill	1,491	49	601	651	576	15	59	20,911	840	1,215	2,052	....	....	43,448.82
Cleveland, Ohio	2,069	19	344	363	316	22	25	10,503	1,706	2,544	1,119	3	39	25,011.55
Detroit, Mich	1,197	26	380	406	368	12	26	11,271	791	1,095	592	....	....	27,860.02
Evansville, Ind	1,132	10	158	168	150	6	12	5,339	964	1,453	18	....	....	15.882.44
Fort Stanton, N. Mex	346	202	144	346	109	40	197	82,061	....	....	....	....	....	129,098.20
Key West, Fla	606	13	140	153	142	5	6	3,815	453	668	109	3	26	14,397.41
Louisville, Ky	717	15	175	190	168	11	11	5,533	527	1,198	41	....	....	13,694.62
Memphis, Tenn	1,272	16	338	354	328	6	20	7,235	918	1,327	45	....	....	17,515.45
Mobile, Ala	1,006	28	268	296	267	9	20	8,972	710	944	585	40	534	17,196.33
New Orleans, La	2,551	64	586	650	562	24	64	21,198	1,901	3,861	951	129	1,989	33,716.39
New York, N. Y	4,757	103	1,769	1,872	1,739	40	93	42,938	2,885	4,630	9,754	5	76	64,504.63
Pittsburgh, Pa	477	12	122	134	123	6	5	3,751	343	469	58	....	....	16,648.24
Portland, Me	549	10	207	217	188	4	25	6,545	332	497	392	46	559	22,758.45
Port Townsend, Wash	462	45	325	370	306	8	56	23,543	92	170	71	71	1,248	24,637.45
St. Louis, Mo	1,060	24	259	283	234	19	30	10,487	777	1,291	39	....	....	21,976.72
San Francisco, Cal	4,431	77	1,338	1,415	1,271	39	105	37,139	3,016	6,839	4,357	51	682	55,064.48
Savannah, Ga	1,126	38	302	340	308	10	22	9,677	786	1,075	368	11	97	18,895.29
Vineyard Haven, Mass	237	11	108	119	102	6	11	5,015	118	162	8	1	5	13,192.58
Wilmington, N. C	373	12	195	207	201	6	....	3,239	166	232	11	4	27	12,141.11
Total	33,006	894	9,406	10,300	9,021	343	936	378,341	22,706	38,349	25,368	369	5,358	694,455.35

TABLE 2.—*Transactions at marine hospitals and other relief stations, fiscal year 1916*—Continued.

	Total number of patients treated.	Patients in hospital July 1, 1915.	Admitted during the year.	Total number treated in hospital.	Discharged.	Died.	Remaining in hospital June 30, 1916.	Number of days' relief in hospital.	Number of patients furnished office relief.	Number of times office relief was furnished.	Number persons examined physically, including pilots.	Number of foreign seamen treated.	Days hospital relief furnished foreign seamen.	Amount expended.
Second, third, and fourth class stations.														
Albany, N. Y	58	1	13	14	14			311	44	47	24			$788.00
Ancon and Cristobal, Panama Canal	249	8	241	249	229	6	14	4,600						9,932.83
Apalachicola, Fla	104	4	47	51	49		2	465	53	185				1,268.91
Ashland, Wis	84		10	10	9	1		122	74	78				355.50
Ashtabula, Ohio	209		26	26	25	1		320	183	363				1,108.62
Astoria, Oreg	177	2	32	34	34			681	143	196	31			1,473 16
Bangor, Me	55		16	16	15	1		189	39	49	186			731.55
Barnstable, Mass., and subports	8								8	44				47.00
Bay City, Mich	82		13	13	13			120	69	143	5			321.00
Beaufort, N. C	146								146	475				607.90
Beaufort, S. C	3								3	3				85.50
Bellingham, Wash	64		10	10	10			169	54	99				579.25
Boothbay Harbor, Me	78	1	14	15	14	1		184	63	151	25			582.95
Bridgeport, Conn	21		18	18	16	2		306	3	4				336.00
Brunswick, Ga	98		19	19	19			181	79	94	18	12	125	903.50
Burlington, Iowa	37	1	16	17	16		1	284	20	34				529.18
Cairo, Ill	810	12	123	135	125	7	3	1,544	675	1,037	5			10,772.67
Cambridge, Md	45	1	33	34	32	1	1	534	11	11				785.00
Cedar Keys, Fla	38								38	39				59.50
Charleston, S. C	648	3	77	80	78	1	1	1,405	568	868	142	1	4	7,159.63
Chattanooga, Tenn	5		5	5	5			58						155.00
Cincinnati, Ohio	146		15	15	14		1	108	131	316	32			625.13
Crisfield, Md	134		11	11	8	1	2	93	123	237	3			367.70
Delaware Breakwater, Del	211	1	11	12	10	1	1	101	199	238	31			
Duluth, Minn	377	1	24	25	25			361	352	370	870			1,079.74
Eastport, Me	57		1	1	1			1	56	81				59.70
Edenton, N. C	38		1	1	1			8	37	62				136.20
Elizabeth City, N. C	137		4	4	4			32	133	274	147			524.30
Ellsworth, Me	1								1	9				9.00
Erie, Pa	189	2	36	38	36	2		445	151	186	21			1,045.00
Escanaba, Mich	61		9	9	9			109	52	53				480.46
Eureka, Cal	46		11	11	11			88	35	48	1			537.55
Fernandina, Fla	29		4	4	4			39	25	56				449.15
Gallipolis, Ohio	178	2	37	39	36	1	2	754	139	272	15			1,413.00
Galveston, Tex	1,490	14	443	457	432	6	19	6,374	1,033	1,389	574			14,037.90
Georgetown, S. C	215	1	19	20	19	1		161	195	228	23			913.00
Gloucester, Mass	247		28	28	25	2	1	298	219	341	21			1,112.24

Grand Haven, Mich	48	...	16	16	15	...	1	129	32	51	89	...	...	525.95
Green Bay, Wis	90	...	18	18	18	...	...	134	72	83	11	...	...	449.55
Gulfport, Miss	47	...	6	6	6	...	...	108	41	54	35	...	...	737.37
Hartford, Conn	10	...	10	10	8	...	2	239	...	...	3	...	...	239.00
Honolulu. Hawaii	536	11	193	204	186	6	12	5,058	332	551	551	42	811	8,727.50
Hoquiam, Wash	83	1	32	33	33	...	...	441	50	145	4	...	...	1,343.75
Irvington, Va	30	...	1	1	1	...	...	30	29	43	...	...	...	345,00
Jacksonville, Fla	285	1	44	45	43	1	1	432	240	326	181	...	...	1,715.01
Juneau, Alaska	121	...	28	28	26	...	2	565	93	239	10	...	...	2,170.00
Kansas City, Mo	58	1	5	6	3	...	3	165	52	111	10	...	...	657.26
Ketchikan, Alaska	160	2	42	44	43	...	1	450	116	209	2	...	...	1,966.35
La Crosse, Wis	43	...	5	5	5	...	...	39	38	73	10	...	...	411.09
Little Rock, Ark	37	...	15	15	15	...	...	100	22	38	2	...	...	342.50
Los Angeles, Cal	515	3	156	159	148	5	6	2,540	356	626	307	...	...	12,313.81
Ludington, Mich	103	...	18	18	18	...	...	217	85	178	54	...	...	648.35
Machias, Me	23	2	7	9	9	...	...	114	14	23	11	...	...	471.00
Manistee, Mich	61	...	10	10	10	...	...	187	51	73	48	...	...	618.60
Manitowoc, Wis	129	1	52	53	50	1	2	897	76	121	16	...	...	1,273.61
Marquette, Mich	70	...	8	8	7	1	...	89	62	62	109	...	...	474.75
Marshfield, Oreg	29	...	18	18	18	...	...	383	11	13	...	...	...	1,002.15
Menominee, Mich	38	2	9	11	10	1	...	134	27	39	8	...	...	517.30
Milwaukee, Wis	759	2	87	89	81	2	6	1,734	670	928	776	...	...	9,828.47
Nashville, Tenn	49	1	5	6	6	...	...	67	43	104	9	...	...	406.20
Natchez, Miss	101	1	5	6	6	...	...	60	95	294	4	...	...	416.43
New Bedford, Mass	100	...	10	10	9	...	1	143	90	120	111	...	...	581.35
Newbern, N. C	200	...	19	19	19	...	...	101	181	307	30	...	...	764.00
New Haven, Conn	29	...	10	10	7	...	3	214	19	22	83	...	...	539.97
New London, Conn	89	2	27	29	25	1	3	473	60	75	136	...	...	2,154.16
Newport, Ark	91	...	3	3	3	...	...	39	88	127	...	...	...	469.77
Newport, Oreg	24	...	3	3	3	...	...	15	21	67	...	...	...	295.75
Newport, R. I	143	4	53	57	53	3	1	796	86	120	6	...	...	1,483.50
Newport News, Va	8	...	...	...	...	...	...	...	8	8	...	...	...	307.20
Nome, Alaska	4	1	1	2	2	...	...	28	2	5	...	...	...	383.25
Norfolk, Va	3,891	36	877	913	866	18	29	12,768	2,978	4,328	1,276	1	4	21,634.52
Ogdensburg, N. Y	129	...	10	10	10	...	...	283	119	203	84	...	...	784.70
Oswego, N. Y	42	...	16	16	16	...	...	341	26	38	...	...	...	816.10
Paducah, Ky	73	...	8	8	7	...	1	93	65	131	1	...	...	478.14
Pensacola, Fla	300	3	55	58	55	...	3	707	242	713	74	...	...	1,506.71
Perth Amboy, N. J	87	...	11	11	9	...	2	95	76	91	5	2	17	195.85
Philadelphia, Pa	1,405	12	270	282	272	9	1	4,352	1,123	1,771	1,549	...	...	18,904.63
Ponce, P. R	37	...	10	10	8	...	2	100	27	54	1	...	...	100.00
Port Angeles, Wash	51	...	...	...	...	...	...	...	51	74	...	...	...	226.50
Port Arthur, Tex	155	...	26	26	23	1	2	280	129	342	122	...	...	611.54
Port Aransas, Tex	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
Port Huron, Mich	86	...	7	7	7	...	...	74	79	234	82	...	...	411.00
Portland, Oreg	824	9	168	177	165	4	8	4,027	647	1,001	514	31	421	10,369.86
Portsmouth, N. H	26	1	5	6	6	...	...	68	20	20	...	...	...	173.00
Port Tampa, Fla	110	3	41	44	43	1	...	618	66	66	159	...	...	1,699.75
Providence, R. I	431	7	161	167	155	9	4	4,541	264	398	821	...	...	6,449.72
Provincetown, Mass	64	...	1	1	1	...	...	1	63	101	13	...	...	310.91
Reedville, Va	117	...	...	...	...	...	...	...	117	134	...	...	...	173.80
Richmond, Va	40	...	10	10	10	...	...	110	30	31	11	...	...	443.00

TABLE 2.—*Transactions at marine hospitals and other relief stations, fiscal year 1916*—Continued.

	Total number of patients treated.	Patients in hospital July 1, 1915.	Admitted during the year.	Total number treated in hospital.	Discharged.	Died.	Remaining in hospital June 30, 1916.	Number of days' relief in hospital.	Number of patients furnished office relief.	Number of times office relief was furnished.	Number persons examined physically, including pilots.	Number of foreign seamen treated.	Days hospital relief furnished foreign seamen.	Amount expended.
Second, third, and fourth class stations—Continued.														
Rockland, Me	210		3	3	3			13	207	415	21			$502.90
St. Elizabeths Hospital, Washington, D. C	60	45	15	60	2	5	53	17,058						10,981.06
St. Paul, Minn	8		4	4	4			52	4	5				173.50
Saginaw, Mich	45		6	6	5		1	95	39	53	6			397.83
Salem, Mass	4								4	4				4.00
San Diego, Cal	190	3	71	74	55	2	17	1,170	116	234	4	1	15	7,380.69
Sandusky, Ohio	48		6	6	6			136	42	46	2			335.25
San Juan, P. R	1,612	7	116	123	114	2	7	3,223	1,489	1,579	172			2,243.56
Sault Ste. Marie, Mich	214	1	121	122	118	2	2	1,137	92	117	72			1,738.26
Seattle, Wash	2,186	21	311	332	316	8	6	3,970	1,854	3,760	2,031	7	79	14,757.91
Sheboygan, Wis	17	1	13	14	14			110	3	10	8			438.01
Solomons, Md	296		10	10	9	1		82	286	372				648.23
Superior, Wis	63		25	25	22		3	219	38	45				1,904.71
Tacoma, Wash	115		15	15	14	1		156	100	185	82	1	9	1,186.85
Toledo, Ohio	404	3	114	117	110	4	3	1,711	287	800	286			2,665.40
Unalaska, Alaska	8	2	2	4	3	1		101	4	5				371.00
Valdez, Alaska	47		4	4	4			47	43	88				767.32
Vicksburg, Miss	200	1	83	84	81	2	1	691	116	203	7			1,675.12
Washington, D. C	177	2	40	42	41	1		505	135	233	24			2,135.53
Washington, N. C	139		17	17	17			225	122	175	7			858.75
Quarantine stations	137								137	265	21			
Coast Guard Cutter Androscoggin	675		13	13	12		1	99	662	1,175	136			
Trachoma hospitals.														
Jackson, Ky	1,992	9	399	408	395		13	4,981	1,584	7,054				
London, Ky	2,625		387	387	377		10	2,903	2,238	3,514				
Hindman, Ky	1,117	10	418	428	420		8	5,292	689	2,816				
Coeburn, Va	2,599		399	399	396		3	3,154	2,200	3,748				
Welch, W. Va	1,517		258	258	244		14	1,972	1,259	3,413				
Spartanburg, S. C	191	31	120	151	117	3	31	8,969	40	5,555				

For special examination of members of the Coast Guard.														
Accomac, Va											4			
Alpena, Mich											16			
Amityville, N. Y											13			
Cape Charles, Va											15			
Cheybogan, Mich											16			
Block Island, R. I											11			
East Hampton, N. Y											9			
Grand Marias, Mich											8			
Hatteras, N. C											8			
Manteo, N. C											15			
Nantucket, Mass											10			
Orleans, Mass											20			
Patchogue, N. Y											52			
Portsmouth, N. H											31			
Rogers City, Mich											4			
Total	35,452	296	6,928	7,224	6,776	131	317	106,067	28,228	58,914	12,617	98	1,485	232,508.28

Total expenditures for first-class stations	$694,455.35
Total expenditures for second, third, and fourth class stations	232,508.28
Washington, D. C.:	
Bureau	50,637.59
Hygienic laboratory	168,670.31
Purveying depot	58,072.10
Coast Guard cutters and other duty	47,027.03
Immigration	221,604.94
Railroad transportation, freight charges, etc	20,592.63
Miscellaneous	5,507.67
Total expenditures	1,499,075.90

NOTE.—In some cases, the full pay of an officer may be included in the cost of operation of a relief station, though not devoting his entire time to that work, being also engaged on work under other branches of the service.

TABLE 3.—*Summary of physical examinations made by officers of the United States Public Health Service during the fiscal year ended June 30, 1916, exclusive of immigrants.*

Summary of examinations and rejections.	Total.	Pilots.	Merchant seamen.	Coast Guard.	Coast and Geodetic Survey.	Lighthouse Service.	Foreign seamen.	Immigration Service.	Civil Service Commission.	Isthmian Canal Commission.	Philippine Islands.
Total number examined	37,985	3,570	30,179	1,829	217	45	245	382	1,503	2	13
Number passed	33,891	3,480	27,012	1,188	197	45	228	362	1,365	1	13
Number rejected	4,094	90	3,167	641	20	....	17	20	138	1	....
Causes of rejections, diseases, disability, etc.											
Abdominal scar following surgical operation	8		2	6							
Abnormal temperature	2			2							
Abnormal blood pressure	48			47	1						
Abscess of buttock	1			1							
Abscess of tooth	1			1							
Acne	1		1								
Albuminuria	29	1	4	24							
Albuminuria, mitral regurgitation, and stricture of urethra	1		1								
Alcoholism	9		9								
Amblyopia	1		1								
Aneurism of artery	1		1								
Anemia and curvature of spine	1			1							
Ankylosis of joint	5		4						1		
Angioma of thigh	1								1		
Artificial eye	1		1								
Artificial teeth	1			1							
Atrophy of muscle	4		3						1		
Bad united fracture	1		1								
Balanitis	2		2								
Blind in one eye	51	2	49								
Blind in one eye and varix	1		1								
Bright's disease	1			1							
Bronchitis, acute	5		4						1		
Bronchitis and defective vision	1			1							
Bubo	5		4		1						
Bursitis	1						1				
Caries of teeth	1			1							
Cataract of eye	1		1								
Cellulitis of leg	1				1						
Chloasma and varicocele	1		1								
Chloasma and piles	1		1								
Cicatrix due to contusion of hand	1		1								
Conjunctivitis	6		4	2							
Corneal opacity	3		2						1		
Contusion of rib	1		1								
Coryza, acute	1		1								
Curvature of spine	6		2	2					2		
Curvature of spine and piles	1		1								
Curvature of spine and defective teeth	1		1								
Cystitis, chronic	1		1								
Defective color sense	637	36	563	32	2		3				
Defective color sense and defective teeth	1				1						
Defective color sense and varicocele	1		1								
Defective color sense and syphilis	1		1								
Defective color sense and defective vision	30		29		1						
Defective color sense and systolic heart murmur	2			2							
Defective color sense and defective mentality	1		1								
Defective color sense and mitral regurgitation	1		1								
Defective hearing	64	2	57	3					2		
Defective vision	1,615	49	1,427	84			2		53		
Defective vision and underweight	1			1							
Defective vision and hernia	7		7								
Defective vision and irregular heart action	1		1								
Defective vision and defective teeth	9		2	7							
Defective vision and valvular disease of of heart, mitral	1			1							
Defective vision and flat foot	2			2							
Defective vision and alcoholism	2		1	1							
Defective vision and defective hearing	4		4								
Defective vision and bronchitis	1		1								
Defective vision and varix	5		4	1							

TABLE 3.—*Summary of physical examinations made by officers of the United States Public Health Service during the fiscal year ended June 30, 1916, exclusive of immigrants*—Continued.

Summary of examinations and rejections.	Total.	Pilots.	Merchant seamen.	Coast Guard.	Coast and Geodetic Survey.	Lighthouse Service.	Foreign seamen.	Immigration Service.	Civil Service Commission.	Isthmian Canal Commission.	Philippine Islands.
Causes of rejections, diseases, disability, etc.—Continued.											
Defective vision and gonorrhea	1		1								
Defective vision and varicocele	2		1	1							
Defective vision and senility	2		2								
Defective vision and pyorrhea alveolaris	1		1								
Defective vision and frontal scar	1			1							
Defective vision and high blood pressure	1			1							
Defective vision and enlarged testicles	1		1								
Defective vision and loss of teeth	1		1								
Defective teeth	55		5	49	1						
Defective and missing teeth	21		2	19							
Defective teeth and gonorrhea	1			1							
Defective teeth and curvature of spine	1			1							
Defective teeth and piles	1		1								
Defective teeth and hearing	1		1								
Defective teeth and underweight	2			2							
Defective teeth and high blood pressure	2			2							
Defective mentality	11		8	3							
Defective feet	2								2		
Deformity of fingers	1		1								
Deformity of toes	1		1								
Dental plate, piles, and enlarged testicles	1		1								
Deformity of elbow	1			1							
Deformity of leg	1		1								
Deviation of nasal septum	5			4					1		
Did not speak English	4		2	2							
Disabled elbow, unclassified	1		1								
Disease of the heart:											
Endocarditis	3		3								
Myocarditis	2		2								
Disordered action of heart, irregularity and intermission	4		2		1			1			
Dilatation of heart	3		2	1							
Aortic stenosis	2		1	1							
Mitral stenosis	1		1								
Hypertrophy of heart	3		1	2							
Systolic murmur	11		9	2							
Dilatation and palpitation	3		3								
Myocarditis and varix	2		2								
Valvular disease of heart, aortic	16		15	1							
Valvular disease of heart, mitral	44		37	4	1			1	1		
Valvular disease of heart, aortic and mitral	12		8				1		3		
Valvular disease of heart, unclassified	54		42	3	1				7	1	
Eczema	3		1	2							
Ectropin of eyelids	1		1								
Edema of connective tissue	1		1								
Edema of prepuce	1		1								
Enlarged abdomen	1		1								
Enlarged tonsils	1			1							
Enlarged glands	5		3	2							
Epilepsy and flat foot	1		1								
Enteritis, acute	1		1								
Epididymitis	2		2								
Epilepsy in family	1			1							
Exophthalmia	1								1		
Epithelioma	1								1		
Excessive temperature	9		4	5							
Family history of dementia	1			1							
Fatty tumor of lip and piles	1		1								
Fistula in ano	5		4						1		
Flat feet	20		4	5					11		
Flat feet and hammer toe	1		1								
Gastritis	2		2								
Gonorrhea	89		70	7			4	3	5		
Gonorrhea and syphilis	1		1								
Hallux valgus and defective teeth	1			1							
Hallux valgus and piles	1		1								
Hallux valgus	1		1								

TABLE 3.—*Summary of physical examinations made by officers of the United States Public Health Service during the fiscal year ended June 30, 1916, exclusive of immigrants*—Continued.

Summary of examinations and rejections.	Total.	Pilots.	Merchant seamen.	Coast Guard.	Coast and Geodetic Survey.	Lighthouse Service.	Foreign seamen.	Immigration Service.	Civil Service Commission.	Isthmian Canal Commission.	Philippine Islands.
Causes of rejections, diseases, disability, etc.—Continued.											
Hernia:											
Umbilical	15		12	2					1		
Inguinal, oblique	313		297	3	3		1		9		
Inguinal, direct	2		2								
Inguinal, incomplete	1		1								
Inguinal, scrotal	9		9								
Femoral	2		2								
Unclassified	63		57	1				1	4		
Inguinal and psoriasis	1		1								
Ventral	1		1								
Inguinal, and piles	2		2								
Inguinal and varicocele	1		1								
Inguinal and undescended testicle	1		1								
Inguinal and senility	1		1								
Inguinal and varix	1		1								
Hydrocele	8		8								
Hydrocele and defective hearing	1		1								
Hypertrophy of tonsils	1		1								
Hypertrophic rhinitis, muco-purulent	1			1							
Impaired action of joint	1			1							
Illiterate	9		9								
Influenza	3		2	1							
Ingrowing toenail, infected	1		1								
Infected wound of hand	1				1						
Infected tonsils, unclassified	1			1							
Impaired joint	1			1							
Inflammation of lymph glands, groin, suppurative	3		3								
Inflammation middle ear, suppurative	3		3								
Insanity	1							1			
Keratitis and conjunctivitis	1		1								
Loss of thumb and varix	1		1								
Loss of testicle	2		2								
Loss of finger	7		2	5							
Loss of eyeball	7		6	1							
Loss of thumb	2		2								
Loss of leg	2		2								
Loss of teeth	92		7	85							
Loss of teeth and defective mentality	1			1							
Lumbago	1						1				
Malaria	3		1	2							
Malformation of foot	1			1							
Myopia	1		1								
Nasal polypus	1			1							
Necrosis of rib, chronic	1		1								
Not vaccinated	9		9								
Not examined	2		2								
Neuritis	5		4	1							
Old fracture of tibia	1		1								
Orchitis	1		1								
Organic disease of central nervous system	1		1								
Osteomyelitis of tibia	1		1								
Otitis media, chronic	4		1	1					2		
Overweight	3		1	2							
Overheight	1			1							
Overweight and albuminuria	1			1							
Paralysis of leg	1		1								
Piles:											
Mixed	1		1								
External and hernia	1		1								
External and bronchitis	1		1								
External and flat feet	2		2								
Unclassified	4		3	1							
Pleurisy and defective vision	1								1		
Phthisis	1		1								
Poor physique	87		10	65				1	11		
Psoriasis	1			1							
Pyorrhea alveolaris	3			3							
Refused examination	2		2								
Refused to strip for examination	4		3	1							

TABLE 3.—*Summary of physical examinations made by officers of the United States Public Health Service during the fiscal year ended June 30, 1916, exclusive of immigrants*—Continued.

Summary of examinations and rejections.	Total.	Pilots.	Merchant seamen.	Coast Guard.	Coast and Geodetic Survey.	Lighthouse Service.	Foreign seamen.	Immigration Service.	Civil Service Commission.	Isthmian Canal Commission.	Philippine Islands.
Causes of rejections, diseases, disability, etc.—Continued.											
Rheumatism	1	......	1	......	....	....	....	....	......	....	....
Ringworm	1	......	1	......	....	....	....	....	......	....	....
Rudimentary penis and testicles	1	......	1	......	....	....	....	....	......	....	....
Scar on chest due to operation	1	......	1	......	....	....	....	....	......	....	....
Scar on abdomen due to operation	7	......	7	......	....	....	....	....	......	....	....
Scabies	5	......	5	......	....	....	....	....	......	....	....
Senility	4	......	3	......	....	....	....	....	1	....	....
Senility and varix	1	......	1	......	....	....	....	....	......	....	....
Senility and piles	1	......	1	......	....	....	....	....	......	....	....
Soft chancre of penis	9	......	7	......	....	....	....	2	......	....	....
Sprain of muscle	1	......	1	......	....	....	....	....	......	....	....
Stiff finger	2	......	2	......	....	....	....	....	......	....	....
Suppuration of middle ear, chronic	2	......	2	......	....	....	....	....	......	....	....
Suppurative wound of thigh	1	......	1	......	....	....	....	....	......	....	....
Subcrepitant râles and defective vision	1	......	1	......	....	....	....	....	......	....	....
Syphilis:											
Primary	2	......	2	......	....	....	....	....	......	....	....
Secondary	16	......	15	1	....	....	....	....	......	....	....
Unclassified	52	......	37	9	1	....	3	2	......	....	....
Tabes dorsalis	1	......	1	......	....	....	....	....	......	....	....
Thyroid goiter	1	......	....	......	....	....	....	....	1	....	....
Tonsilitis, acute	1	......	1	......	....	....	....	....	......	....	....
Tonsilitis and laryngitis	1	......	1	......	....	....	....	....	......	....	....
Tuberculosis of lungs	25	......	19	1	....	....	....	2	3	....	....
Tuberculosis of general urinary tract	1	......	1	......	....	....	....	....	......	....	....
Tumor of testicle	1	......	1	......	....	....	....	....	......	....	....
Tumor of breast	1	......	....	......	....	....	....	....	1	....	....
Trachoma	5	......	4	......	....	....	....	1	......	....	....
Ulcer of penis	3	......	2	......	1	....	....	....	......	....	....
Ulcer of palate, syphilitic	1	......	1	......	....	....	....	....	......	....	....
Ulcer of leg	2	......	2	......	....	....	....	....	......	....	....
Ulcer of thigh	1	......	1	......	....	....	....	....	......	....	....
Underweight	56	......	....	56	....	....	....	....	......	....	....
Underheight	17	......	3	13	1	....	....	....	......	....	....
Underweight and defective teeth	2	......	....	2	....	....	....	....	......	....	....
Underweight and defective vision	1	......	....	1	....	....	....	....	......	....	....
Undescended testicle	1	......	....	1	....	....	....	....	......	....	....
Unable to give family history	1	......	....	1	....	....	....	....	......	....	....
Varix	76	......	65	4	1	....	1	4	1	....	....
Varix and piles	2	......	2	......	....	....	....	....	......	....	....
Varix and defective color sense	1	......	1	......	....	....	....	....	......	....	....
Varix and hammer toe	1	......	1	......	....	....	....	....	......	....	....
Varix and varicocele	1	......	1	......	....	....	....	....	......	....	....
Varicocele	35	......	10	15	1	....	....	1	8	....	....
Varicocele and defective teeth	1	......	....	1	....	....	....	....	......	....	....
Varicocele and hernia	1	......	1	......	....	....	....	....	......	....	....
Varicocele and atrophy of testicle	1	......	1	......	....	....	....	....	......	....	....
Varicocele and defective vision	2	......	2	......	....	....	....	....	......	....	....
Varicose ulcers	1	......	1	......	....	....	....	....	......	....	....
Venereal warts	1	......	1	......	....	....	....	....	......	....	....
Warts on hands	1	......	....	1	....	....	....	....	......	....	....
Wax in ear and defective hearing	1	......	1	......	....	....	....	....	......	....	....
Wound, operative, not healed	1	......	1	......	....	....	....	....	......	....	....

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916.*

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
Total cases	**1,190**	**16,334**	**8,608**	**6,636**	**553**	**474**	**1,253**	**50,934**	**68,458**
General diseases	**519**	**5,392**	**2,366**	**2,582**	**213**	**203**	**547**	**14,846**	**20,757**
Smallpox		2	1		1			3	5
Cowpox		1		1				20	21
Chicken pox		3	1				2	11	14
Measles		50	46	1			3	5	55
Scarlet fever		4	4					1	5
Dengue		7	5	2				10	17
Influenza	2	669	598	64	1	6	2	1,331	1,991
Mumps	1	22	22		1			14	37
Diphtheria		12	9			2	1	1	13
Cerebrospinal fever		1	1						1
Simple continued fever	1	16	14	2	1			25	42
Enteric fever	26	220	173	9	4	31	29	29	255
Choleraic diarrhea		3	3					8	11
Epidemic diarrhea								7	
Dysentery	3	42	25	14	2	1	3	63	108
Beriberi		29	18	8			3		29
Malarial fever:									
Intermittent	18	468	358	112	4	2	10	1,066	1,552
Remittent		100	69	25	3		3	210	310
Phagedena, sloughing		3		3				1	4
Erysipelas		22	17	3		2		11	33
Pyemia		1	1						1
Septicemia	1	7	2	4		2		20	28
Tubercle	250	519	12	331	80	96	250	175	944
Leprosy	2						2		2
Syphilis:									
Primary	2	113	4	103	4	1	3	193	308
Secondary	74	929	3	897	25	10	68	2,705	3,608
Tertiary	4	64		52	3	7	6	73	141
Gonorrhea	38	738	288	435	14		39	5,000	5,776
Diseases dependent on animal parasites:									
Anopheles								3	3
Ascaris lumbricoides								1	1
Musca domestica								1	1
Necator americanus		1		1					1
Oxyuris vermicularis								2	2
Pediculus capitis								2	2
Pediculus vestimenti								5	5
Phthirius pubis		1	1					16	17
Sarcopsylla penetrans								1	1
Sarcoptes scabiei	1	20	17	4				271	292
Tenia barbæ								7	7
Tenia circinata		3	2	1				4	7
Tenia mediocanellata		1			1				1
Tenia saginata		1	1					3	4
Tenia solium		9	7	1			1	11	20
Tenia tonsurans		8	7	1				47	55
Tenia versicolor		1	1					1	2
Trichocephalus dispar		1	1						1
Diseases dependent on vegetable parasites:									
Cryptococcus		1					1		1
Trichophyton tonsurans	1	4	4	1				41	46
Effects of animal poisons; decayed and poisonous food		24	20	3		1		9	33
Effects of vegetable poisons:									
Morphine		1	1					7	8
Opium		2	1		1			1	3
Tobacco		1	1					10	11
Poison ivy		3	2	1				9	12
Poison oak		1	1					12	13
Effects of inorganic poisons:									
Phenol								2	2
Sulphur								1	1
Cyanogen								3	3
Lead		4	4					10	14
Ammonia		1	1						1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
Effects of inorganic poisons—Con.									
Acetanilid		1	1						1
Caustic soda		1		1					1
Coal gas		3	3						3
Oxalic acid								1	1
Effects of the presence of foreign bodies		11	7	4				42	53
Effects of mechanical injuries		1		1				26	27
Effects of heat		4	3				1	2	6
Effects of cold								1	1
Effects of chemical agents								16	16
Effects of excessive exertions and strain		1		1				3	4
Pellagra	32	132	3	102	24	3	32	49	213
Alcoholism	3	220	141	63	5	4	6	208	431
Rheumatic fever	5	100	62	26	1	1	15	35	140
Rheumatism	33	520	301	205	11	1	35	1,995	2,548
Gout		5	2	3				2	2
Osteoarthritis	4	12	1	5	1		9	5	19
Cyst:									
Mucous								3	3
Sebaceous		25	17	7			1	83	108
New growth, nonmalignant:									
Lipoma	1	14	12	1	2			19	34
Fibroma	1	5	3	1			2	20	26
Condyloma		4	1	3				44	48
Osteoma		3	2				1	2	5
Pterygium		2	2					4	6
Myxoma		1					1	8	9
Myoma								1	1
Hemangioma		1					1	1	2
Papilloma	1	26	13	12	2			71	98
Adenoma								2	2
New growth, malignant:									
Sarcoma	1	1		1	1			8	10
Carcinoma	2	48	10	8	11	15	6	30	80
Squamous carcinoma	4	4	1	5	1	1		2	10
Rodent ulcer		1			1				1
Myxedema		1		1					1
Anemia	1	7	1	4	2	1		72	80
Idiopathic anemia		5		1		4			5
Purpura		1					1	4	5
Hodgkin's disease		4		2	1		1	2	6
Diabetes mellitus	2	23	1	15	2	6	1	119	144
Diabetes insipidus		1	1					3	4
Leucocythemia		2		1	1			1	3
Congenital malformations		19	11	5	2		1	121	140
Hemophilia		1	1						1
Debility	5	44	19	21		2	7	378	427
Old age		2		2				1	3
LOCAL DISEASES.									
DISEASES OF THE NERVOUS SYSTEM.	156	401	86	217	69	28	157	1,144	1,701
Of the nerves—									
Inflammation—									
Neuritis	4	60	19	31	3	1	10	174	238
Multiple neuritis	1	17	5	9	3	1		5	23
Degeneration of nerves, primary								2	2
Of the spinal cord and membranes—Cord—									
Inflammation—									
Diffuse	1	4		1	1	1	2	1	6
Local		1		1				1	2
Degeneration—									
Of anterior cornua	1						1		1
Of lateral columns	1	2		1			2	2	5
Of posterior columns	29	21	3	16	4	4	23	21	71
Of lateral and posterior columns	1						1		1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE NERVOUS SYSTEM—Continued.									
Of the brain and its membranes—Membranes—Inflammation—									
Of dura mater								3	3
Of pia mater and arachnoid	2	1				1	2	2	5
Hemorrhage		1		1					1
Of the brain and its membranes—Brain—									
Inflammation		1		1					1
Sclerosis		3		2	1				3
Hemorrhage	4	10		6		4	4	8	22
Hyperemia								1	1
Anemia		1		1				11	12
Functional nervous disorders with other diseases of undetermined nature—									
Apoplexy		7	1	5		1		3	10
Paraplegia	3	4		4	1	1	1		7
Hemiplegia	30	46		32	4	7	33	26	102
Monoplegia		1		1					1
Local paralysis	1	7	1	6	1			21	29
Incomplete paralysis	3	4		2	4		1	2	10
Paralysis agitans								3	3
Chorea		1			1				1
Spasm	1	10	8	2	1			9	20
Torticollis		3		3					3
Occupation, neurosis, spasmodic		1	1						1
Epilepsy	3	23	2	18	4		2	32	58
Vertigo		4	2	2				21	25
Headache		12	3	6	1		2	168	180
Hyperesthesia								6	6
Hiccough								4	4
Neuralgia	4	46	20	21	7		2	247	297
Hysteria		7	3	3	1			12	19
Nervous weakness	3	58	11	32	16		2	325	386
Aphasia	1						1	14	15
Somnambulism								4	4
Mental diseases—									
Delusional insanity	4	5			5		4		9
Dementia, arteriosclerotic		2					2		2
Dementia, postapoplectic	2						2		2
Dementia, precox	24	5	2			3	24		29
Dementia, traumatic	1						1		1
Dementia, unclassified	7	13	2	4	6	2	6	4	24
Depression, undifferentiated	1	1					2		2
Epilepsy	1						1		1
General paralysis of the insane	5	4		1	2	2	4		9
Mania	3	2			1		1	1	6
Melancholia	5	8	2	4	2		5	11	24
Mental stupor	1	1	1	1					2
Paranoid state	1						1		1
Psychosis, manic depressive	7	1					8		8
Psychosis, toxic		1					1		1
Psychosis, undifferentiated		2					2		2
Syphilis, cerebral	1						1		1
DISEASES OF THE EYE	25	1,999	1,446	513	11	1	53	8,660	10,684
Conjunctivitis—Catarrhal—									
Acute		36	23	12			1	370	406
Chronic		4	2	2				14	18
Purulent		1		1					1
Granular (trachoma)	19	1,862	1,388	444	1		48	7,970	9,851

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE EYE—Continued.									
Edema of conjunctiva		1		1					1
Chronic hyperemia of conjunctiva								1	1
Degeneration of conjunctiva		1	1						1
Keratitis	1	4		5				7	12
Ulceration of cornea	3	16	11	6	2			27	46
Opacity of cornea								3	3
Acquired deformity of cornea		2	1		1			2	4
Mydriasis								2	2
Scleritis		1					1	3	4
Myosis								1	1
Iritis		28	7	20		1		33	51
Congestion of optic disk								1	1
Glaucoma		3	1	2				2	5
Optic neuritis								2	2
Atrophy and degeneration of optic nerve or papilla	1	2		1	1		1	1	4
Retinitis	1	2		3				3	6
Lenticular cataract		13	4	6	2		1	12	25
Hemorrhage in retinal layers								3	3
Detachment of retina								1	1
Perverted visual sensations								1	1
Amblyopia—									
Functional night blindness								3	3
Temporary blindness		1	1						1
Ametropia		4	1	2	1			23	27
Presbyopia		2	1		1			10	12
Congenital color blindness								5	5
Panophthalmitis								1	1
Asthenopia		4	1	2	1			1	5
Squint		1		1					1
Diplopia								2	2
Neuralgia of eyeball								1	1
Dacryocystitis		2	1	1				13	15
Obstruction of nasal duct		1		1				3	4
Blepharitis marginalis		2		2				10	12
Sty		3	2		1			41	44
Abscess of eyelid		2	2					6	8
Ptosis		1					1		1
Abscess of lacrymal gland								2	2
Edema of eyelid								5	5
Trichiasis								72	72
Opacity of vitreous humor								1	1
Muscae volitantes								2	2
DISEASES OF THE EAR	2	77	34	33	7	0	5	516	595
Inflammation of the external meatus—									
Acute		7	5	1			1	63	70
Chronic		2		2				5	7
Abscess	1	3	3	1				25	29
Accumulation in external meatus of wax or epidermis		5	3	1	1			211	216
Imflammation of the middle ear—									
Nonsuppurative		19	8	9	1		1	114	133
Suppurative	1	31	14	15	2		1	64	96
Within the mastoid cells		7	1	2	3		1	1	8
Perforation of membrana tympani								3	3
Necrosis of ossicles								1	1
Ancklosis of ossicles		1		1				9	10
Obstruction of Eustachian tube								2	2
Tinnitus		1		1				4	5
Deafness		1					1	12	13
Necrosis of internal ear								2	2

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE NOSE	1	69	38	27	3	0	2	572	642
Inflammation of soft parts	1	29	17	12			1	439	469
Inflammation of framework, necrosis								5	5
Diseases of septum—									
Hematoma		1	1					1	2
Abscess								6	6
Deviations		24	13	8	3			22	46
Epistaxis		1	1					11	12
Inflammation of the accessory sinuses		13	5	7			1	38	41
Inflammation of the nasopharynx		1	1					50	51
DISEASES OF THE CIRCULATORY SYSTEM	50	441	90	269	21	70	41	617	1,108
Pericarditis		5	1	3		1		4	9
Endocarditis	4	16	2	9		8	1	3	23
Valvular disease—									
Aortic	12	47		38	2	15	4	69	128
Mitral	14	121	2	92	5	20	16	193	328
Aortic and mitral	4	33		23	1	10	3	36	73
Inflammation of muscular substance	1	14	1	11	1		2	17	32
Degeneration of heart—									
Fatty								13	13
Fibrous								6	6
Aneurysm of heart, traumatic	1			1				3	4
Hypertrophy of heart		2		2				7	9
Dilatation of heart	1	13	1	8		4	1	1	15
Angina pectoris	1	3		3	1			5	9
Disordered action of the heart—									
Abnormal slowness		1					1	3	4
Abnormal rapidity		6		5	1			33	39
Irregularity	2	15	1	12	1	2	1	37	54
Arteritis	1	12		10	2	1		8	21
Obstruction of veins								13	13
Degeneration of arteries, arterio-capillary fibrosis	3	16		9	1	5	4	31	50
Aneurysm of arteries	1	10		4	2	4	1	7	18
Obstruction of arteries, embolism		1		1				1	2
Phlebitis	2	9	7	4				5	16
Varix	3	114	73	33	4		7	116	233
Syncope		2	2					2	4
Rupture capillaries of face		1		1					1
Aneurysm of artery, traumatic								1	1
Nevus								3	3
DISEASES OF THE RESPIRATORY SYSTEM	36	679	352	258	20	53	32	2,529	3,244
Hay fever		5	1	3		1		8	13
Edema of glottis		1				1		3	4
Inflammation of mucous membrane of larynx—									
Catarrhal, acute	1	8	3	5	1			155	164
Catarrhal, chronic		2		2				48	50
Membranous								6	6
Tracheitis								10	10
Bronchitis—									
Catarrhal, acute	5	211	144	61	4	1	6	1,838	2,054
Catarrhal, chronic	4	76	14	57	4	1	4	172	252
Neuralgia of larynx								1	1
Spasmodic asthma	5	41	5	32	4	2	5	71	117
Congestion of lung		6	2	4				1	7
Hemorrhage of lung, hemoptysis		4		4				3	7

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE RESPIRATORY SYSTEM—Continued.									
Pneumonia	8	156	98	20	1	38	7	20	184
Broncho-pneumonia		21	13	4		2	2	7	28
Abscess of lung		1				1			1
Dilatation of brônchi								1	1
Phthisis—									
Acute		7	1	3		3		17	24
Chronic	1	9		6	1	1	2	7	17
Tubercular		1		1				1	2
Pleurisy—									
Acute	10	99	65	34	3	2	5	116	225
Chronic	1	16	3	12	1		1	37	54
Empyema	1	5	1	4			1	2	8
Hydrothorax		2	1	1					2
Pneumothorax								2	2
Adhesions of pleura								1	1
Edema of lungs, acute		1		1				1	2
Emphysema of lung		7	1	4	1		1	1	8
DISEASES OF THE DIGESTIVE SYSTEM	84	1,955	1,373	487	67	30	82	6,095	8,134
Inflammation of the lips								18	18
Ulceration of the lips		4		2	1		1	8	12
Inflammation of the mouth	1	1		2				43	45
Ulceration of the mouth		8	2	6				14	22
Leontiasis ossea								1	1
Inflammation of the dental pulp								9	9
Suppuration of the dental pulp		1		1				4	5
Caries of dentine and cementum		1	1					70	71
Necrosis of cementum								1	1
Inflammation of dental periosteum		2	2					3	5
Abscess of dental periosteum		6	5	1				40	46
Inflammation of gums and alveoli		1	1					27	28
Suppuration of alveoli	3	7	2	7	1			54	64
Ulceration of gums and alveoli		2	1	1				16	18
Caries of the alveoli		1	1					15	16
Toothache		3	3					50	53
Necrosis of jaw		2	1				1		2
Retention of deciduous teeth								2	2
Inflammation of the tongue		1					1	10	11
Ulceration of the tongue								11	11
Sore throat		7	5	2				149	156
Inflammation of tonsils—									
Follicular	16	216	182	37			13	437	669
Suppuration	1	31	23	9				33	65
Hypertrophy of tonsils		41	31	5	4		1	26	67
Elongated uvula								14	14
Inflammation of salivary glands		1		1				2	3
Salivation								2	2
Inflammation of the pharynx—									
Catarrhal		24	15	7	1	1		175	199
Granular								5	5
Follicular		2	1	1				24	26
Dry mouth								1	1
Salivary fistula								1	1
Salivary calculus								1	1
Post-pharyngeal abscess		1	1						1
Ulceration of pharynx								2	2
Stricture of esophagus		1		1				1	2
Inflammation of the stomach—									
Catarrhal	9	158	94	60	4	4	5	433	600
Phlegmonous or suppurative								1	1
Tympanites								2	2

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE DIGESTIVE SYSTEM—Continued.									
Ulceration of the stomach—									
Superficial		21	9	8	2		2	46	6
Perforating		4	1			2	1	2	6
Hemorrhage of the stomach		1		1				1	2
Hyperemia of stomach								2	2
Dilatation of the stomach	1						1	2	3
Indigestion	2	97	60	32	4	1	2	1,216	1,315
Spasm of stomach								1	1
Pyrosis								5	5
Eructation								1	1
Nausea								4	4
Vomiting		2	2					5	7
Gastralgia		10	6	4				24	34
Heartburn								3	3
Hemorrhage of intestine								2	2
Loss of appetite								66	66
Displacement of stomach		1		1					1
Inflammation of the intestines—									
Enteritis	1	47	36	10	1		1	126	174
Typhlitis	8	164	108	39	3	8	14	127	299
Colitis	1	18	16	2	1			23	42
Catarrhal		37	4	33				18	55
Ulceration of the intestines		6	2	2			2	3	9
Intestinal concretions		1	1						1
Fecal accumulation		19	14	4			1	23	42
Hernia	17	464	388	34	31	2	24	493	974
Intussusception		3		2			1	1	4
Obstruction of the intestines	1	3	1	1		2			4
Stricture of intestine	1	3	1	2			1		4
Intestinal dyspepsia		8	5	2			1	26	34
Constipation	3	90	53	37			3	1,156	1,249
Colic		17	17					56	73
Diarrhea	2	42	37	7				335	379
Fistula of intestine		2	2						2
Volvulus		2	1		1				2
Inflammation of the rectum								3	3
Ulceration of anus								2	2
Periproctitis, abscess		27	17	10				19	46
Fissure of the anus		6	4	2				15	21
Fistula in ano	4	58	28	28	5		1	42	104
Prolapse of the rectum		7	4	2	1				7
Ulceration of rectum		12	8	4					12
Recto-vesical fistula								2	2
Piles—									
Internal		31	22	9				61	92
External	1	48	38	10	1			189	238
Mixed	3	51	38	13	1		2	22	76
Pruritus ani		2	2					37	39
Inflammation of the liver—									
Acute	2	5		4	1	2		30	37
Acute suppuration		2		1		1			2
Acute abscess		2		2				1	3
Chronic	2	10		9	1	2		6	18
Hyperemia of the liver		12	11	1				83	95
Acute yellow atrophy of liver		1	1						1
Atrophy of the liver								1	1
Hypertrophy of the liver								1	1
Jaundice	1	36	23	13			1	34	71
Inflammation of hepatic ducts and gall bladder	2	40	31	7	2	2		45	87
Calculi	1	6	2	3		1	1	7	14
Biliary colic		2		2				6	8
Inflammation of the peritoneum	1	8	4	3		1	1	4	13
Dropsy		1			1			3	4
Omental hernia		1	1						1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE DIGESTIVE SYSTEM—Continued.									
Perforation of gall bladder with biliary fistula		1	1						1
Adhesions of peritoneum		4	3			1		1	5
Accumulation of bile								9	9
DISEASES OF THE LYMPHATIC SYSTEM	18	394	194	178	13		27	635	1,047
Hypertrophy of spleen		2		1	1			1	3
Inflammation of lymph glands, suppuration	18	387	191	176	11		27	616	1,021
Hypertrophy of lymph glands		2		1	1			10	12
Inflammation of lymphatics, suppuration		3	3					8	11
DISEASES OF THE THYROID BODY		1		1				8	9
Inflammation								1	1
Goitre		1		1				7	8
DISEASES OF THE URINARY SYSTEM	30	313	58	207	14	37	27	546	889
Acute nephritis	5	31	5	24		6	1	43	79
Bright's disease—									
Chronic nephritis	15	175	7	129	12	25	17	101	291
Granular kidney	2	12		10	1	3		9	23
Nephralgia								3	3
Hydronephrosis	1			1				1	2
Pyelitis		8	4	3			1	4	12
Abscess—									
Of kidney	1	1	2						2
Pyonephrosis		1	1						1
Glycosuria								1	1
Congestion of kidney								4	4
Chyluria								1	1
Calculus in kidney	1	10	3	7		1		7	18
Calculus in ureter		5	2	3				6	11
Suppression of urine								5	5
Hæmaturia	1	3	1	2			1	8	12
Albuminuria								4	4
Lithuria								10	10
Phosphaturia								7	7
Oxaluria								1	1
Inflammation of bladder—									
Acute	1	37	21	14			3	155	193
Subacute		3	2	1				30	33
Chronic	1	12	2	5	1	1	4	40	53
Calculus of bladder	1		1					5	6
Rupture of bladder		5	2	2		1			5
Ileo-vesical fistula		1	1						1
Irritability of bladder	1	4	2	3				54	59
Retention of urine		4	2	2				5	9
Incontinence of urine		1		1				42	43
DISEASES OF THE GENERATIVE SYSTEM	55	953	531	395	20	3	59	2,193	3,201
Urethritis		5	1	3			1	97	102
Gleet								6	6
Abscess of the urethra	1	5	2	4				5	11
Ulcer of the urethra		1					1	1	2
Hemorrhage of the urethra		1	1						1
Stricture of urethra—									
Organic	6	89	24	67	2	1	1	230	325
Traumatic	1	7	2	4	2			4	12
Spasmodic								1	1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE GENERATIVE SYSTEM—Continued.									
Urethral fistula	3	5	2	4		1	1	8	16
Extravasation of urine	1		1						
Impacted calculus		3	1	1	1			1	1
Inflammation of the prostate—									
Acute		6	1	4			1	13	19
Chronic	2	6	1	6			1	15	23
Prostatarrhea		2	1	1				3	5
Abscess of prostate		1				1		2	2
Hypertrophy of the prostate	2	12		11	1		2	48	62
Atrophy of prostate								1	1
Posthitis								5	5
Phimosis	1	84	62	18	1		4	52	137
Paraphimosis		8	7	1				16	24
Edema of prepuce								4	4
Inflammation of the penis, of the glans		5	3	2				17	22
Abscess of penis		2	2					3	5
Ulcer of the penis	5	58	35	25			3	381	444
Edema of penis		4	2	2				4	8
Soft chancre	20	295	136	153	5		2	774	1,089
Chordee								1	1
Edema of the scrotum								4	4
Inflammation of the scrotum								5	5
Abscess of the scrotum		3	1	2				3	6
Sloughing of the scrotum	1		1						1
Pruritus of the scrotum								4	4
Torsion of the spermatic cord								1	1
Inflammation of the spermatic cord		3	2				1	7	10
Hydrocele of the spermatic cord	2	20	14	8				21	43
Hypertrophy of prepuce		2	2						2
Varicocele	1	98	82	9	5		3	112	211
Hydrocele of tunica vaginalis	4	39	34	8	1			42	85
Inflammation of the testicle—									
Acute orchitis	2	40	26	13	1		2	129	171
Chronic orchitis		43	25	17	1			27	70
Epididymitis	3	62	42	11			12	76	141
Abscess of testicle		1	1					3	4
Atrophy of testicle								2	2
Spermatorrhea								12	12
Torsion of testicle		1		1					1
Impotence								20	20
Soft chancre of the scrotum		37	15	18			4	14	51
Hematocele of tunica vaginalis		1		1					1
Inflammation of the fallopian tube		2	1				1		2
Inflammation of the uterus		1	1						1
Distention of the fallopian tube								1	1
Displacements and distortions of the uterus								1	1
Prolapse of anterior wall of vagina								1	1
Amenorrhea		1		1				1	2
Dysmenorrhea								1	1
Menorrhagia								3	3
Leukorrhea								2	2
Discharge of watery fluid from uterus								1	1
Threatened miscarriage								1	1
Hypertrophy of male breast								3	3
Inflammation of male breast								3	3
Inflammation of mammary gland								1	1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE ORGANS OF LOCOMOTION	25	368	191	154	26	2	20	1,636	2,029
Inflammation of the bones—									
Osteitis	2	19	6	9	4	1	1	24	45
Periostitis		11	3	8				12	23
Caries		2		2				2	4
Necrosis	3	18	9	6	2		4	7	28
Ununited fracture or false joint								1	1
Inflammation of joints—									
Acute synovitis	6	49	17	35			3	87	135
Chronic synovitis	1	4	2	2	1			3	8
Suppuration		4	1	2			1	1	5
Chronic abscess of bone								7	7
Ankylosis	1	2	1	1			1	5	8
Dislocation of articular cartilage		4	2	2				4	8
Loose body in joint		3	1		2				3
Relaxation of ligament		1			1				1
Dislocation of joint		4	3				1		5
Inflammation of spine		1			1				1
Psoas, lumbar, and other abscesses		1		1					1
Posterior curvature of spine	1				1				1
Lateral curvature of spine	1						1		1
Inflammation of muscles		1		1				24	25
Suppuration of muscles	2	2	2	2				2	6
Atrophy of muscle	1			1				5	6
Myalgia—									
Lumbago	4	156	97	48	9	1	5	1,251	1,411
Stiff neck		3	3					3	6
Contracture of muscles								2	2
Inflammation of tendons								5	5
Adhesion of tendons		2	1				1		2
Contraction of tendons		8	6	2				5	13
Inflammation of sheaths of tendons		5	4	1				16	21
Thecal abscess		7	3	4				2	9
Ganglion		3	2	1				3	6
Inflammation of bursæ—									
Acute	1	26	17	8	1		1	53	70
Chronic		14	5	9				32	46
Abscess of bursæ		5	1	4				14	19
Bunion	1	3	4					8	12
Bursal cyst								3	3
Club foot		1		1				1	2
Flat foot	1	9	1	4	4			53	63
DISEASES OF THE CONNECTIVE TISSUE	28	385	241	148	5	3	16	1,317	1,730
Inflammation	11	194	119	71	4	2	9	875	1,080
Abscess	16	186	121	74	1	1	5	424	626
Gangrene	1	1		1			1	2	4
Œdema		1	1					13	14
Elephantiasis		2		1			1		2
Undue formation of fat		1		1				2	3
Emphysema								1	1
DISEASES OF THE SKIN	25	436	205	221	7	5	23	2,657	3,118
Erythema		3	1	1	1			31	34
Pityriasis rosea								8	8
Urticaria		10	6	4				69	79
Prickly heat		1	1					21	22
Eczema	1	39	15	25				465	505
Impetigo		7	4	3				23	30
Pityriasis rubra		1		1				21	22
Prurigro		2	1	1				1	3
Lichen								1	1
Psoriasis	1	10		10	1			43	54

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
LOCAL DISEASES—Continued.									
DISEASES OF THE SKIN—Continued.									
Herpes		1	1					144	145
Zona	2	7	3	4	1		1	40	49
Pemphigus		1	1					3	4
Dermatitis herpetiformis	1	6	4	3				36	43
Acne	1	5	3	3				153	159
Chloasma								4	4
Sycosis		1	1					15	16
Seborrhœa								6	6
Ichthyosis								4	4
Sudamina								1	1
Tylosis		1	1					10	11
Frostbite		11	6	4			1	16	27
Chilblain								3	3
Ulcer	19	186	72	109	2	5	17	454	659
Cicatrices		2	1	1					2
Boil		75	47	27			1	751	826
Carbuncle		45	30	14			1	129	174
Whitlow		8	2	5			1	56	64
Onychia		10	5	4	1			49	59
Corn								26	26
Cheloid		1		1				8	9
Wen		1		1				32	33
Hyperidrosis								4	4
Pruritus								17	17
Lupus		1			1				1
Area of scalp								6	6
Bromidrosis		1					1	2	3
Xanthelasma								1	1
Rhinoscleroma								4	4
INJURIES.									
GENERAL INJURIES	3	127	82	32		13	3	222	352
Effects of heat—									
Burns and scalds	1	54	33	17		3	2	181	236
Heat stroke		25	22	3				2	27
Sunstroke								1	1
Effects of cold		3	2	1				4	7
Effects of chemical irritants and corrosives		1	1					2	3
Multiple injury	1	25	6	9		10	1	24	50
Suffocation		4	3	1					4
Exhaustion		13	12	1				3	16
Shock	1	2	3					5	8
LOCAL INJURIES	133	2,315	1,309	907	48	26	158	6,679	9,127
Contusion of nerves		2	1		1			1	3
Compression of nerves	1			1				1	2
Wound of nerves		1	1					1	2
Stretching of brachial plexus								1	1
Rupture of brachial plexus								3	3
Wound of gland								2	2
Contusion of muscles		4		4				17	21
Strain of muscels	2	18	14	5	1			273	293
Rupture of muscles		1		1				5	6
Impaction of foreign body in ducts								4	4
Strain of tendons		8	5	1	1		1	6	14
Rupture of tendons								1	1
Wound of tendons		2	1	1				2	4
Wound of muscles								1	1
Contusion of skin		3	2	1				43	46
Abrasion of skin		3	2				1	90	93
Wound of skin		5	4	1				164	169
Burn or scald of skin	6	96	52	40		1	9	251	353
Frostbite	1	4	4				1	9	14
Effects on the skin of irritants or corrosives		2	2					14	1

Table 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
INJURIES—Continued.									
Local injuries—Continued.									
Abrasion of mucous membrane								2	2
Wound of mucous membrane								1	1
Burn or scald of mucous membrane		4	2	2				47	51
Contusion of scalp		10	5	3	1		1	18	28
Wound of scalp	3	68	52	16	3			227	298
Contusion of skull		7	2	5				2	9
Fracture of the vault of skull		9	3	2	1	3		6	15
Fracture of the base of skull		6	1			5		1	7
Wound of skull		1	1						1
Concussion of brain		10	8	1		1		7	17
Wound of brain, bullet		1				1			1
Contusion of face		26	12	14				39	65
Wound of face and mouth		34	18	16				160	194
Fracture of facial bones	1	28	9	17	2		1	23	52
Dislocation of nasal cartilages		1		1					1
Injury to alveoli and teeth		1		1					1
Burn or scald of mouth								2	2
Contusion of eyelid		4	2	2				7	11
Wound of eyelid		7	3	3			1	19	26
Chemical injury of eye		2	1	1				7	9
Subconjunctival hemorrhage								5	5
Wound of conjunctiva								4	4
Contusion of eyeball		5	3	1	1			15	20
Foreign bodies in the conjunctiva or cornea		13	8	5				190	203
Foreign bodies in eyeball								23	23
Wound of eyeball	1	7	2	2	3			20	28
Contusion of pinna								1	1
Hematoma of pinna								2	2
Wound of pinna		1	1					14	15
Rupture of membrana tympani		1					1	1	2
Separation of cartilage of ear from bone		1		1					1
Foreign body in external meatus								3	3
Injury of pharynx and esophagus by corrosive substances		1	1						1
Gunshot wound of chest wall		3	1	1		1		3	6
Gunshot wound of leg		1	1						1
Fracture of spine with displacement	2	1					3		3
Contusion of neck		1	1					8	9
Wound of neck		5	2	1	1		1	17	22
Foreign body in the air passages								2	2
Foreign body in the food passages		1	1					6	7
Fracture of sacrum		1	1					2	3
Contusion of chest	3	64	39	27			1	174	241
Dislocation of costal cartilages		1		1					1
Fracture of ribs	5	58	34	19		1	9	86	149
Fracture of sternum		1		1				3	4
Wound of parietes of chest		8	3	3	1		1	16	24
Contusion of back	8	80	59	27			2	132	220
Sprain of back		26	17	8	1			110	136
Wound of back		6	2	3			1	13	19
Fracture of spine	3	3		2		3	1		6
Concussion of cord		3	3					16	19
Contusion of abdomen		19	8	11				26	45
Wound of parietes of abdomen		5	3	2				36	41
Contusion of the pelvis		3	3					6	9
Contusion of the perineum, scrotum, or penis		1		1					1
Wound of the male urethra, perineum, scrotum, testis, or penis		7	3	2		2		24	31
Wound of rectum								1	1

Table 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1916*—Continued.

Diseases.	Remaining in hospital from previous year.	Admitted during the year.	Recovered.	Improved.	Not improved.	Died.	Remaining in hospital at close of year.	Treated at dispensary.	Total treated in hospital and dispensary.
INJURIES—Continued.									
Local injuries—Continued.									
Fracture or dislocation of pelvic bones	......	4	1	1	1	1	....	2	6
Laceration of bladder without wound	......	1	1	....	....	......	....	....	1
Fracture of vertebræ with compression of cord	1	1	......	2	....	......	....	....	2
Contusion of testicle	1	3	3	1	....	......	....	19	23
Separation of symphysis pubis	......	....	......	....	....	......	....	1	1
Contusion of upper extremities	3	114	61	49	2	......	5	605	722
Sprain of shoulder	......	19	7	12	....	......	....	28	47
Sprain of elbow	......	1	......	1	....	......	....	13	14
Sprain of wrist	......	19	9	7	2	......	1	120	139
Sprain of hand	......	....	......	....	....	......	....	8	8
Sprain of thumb	......	1	1	....	....	......	....	4	5
Sprain of finger	......	1	1	....	....	......	....	8	9
Wound of upper extremities	12	300	175	121	5	......	11	1,906	2,218
Wound of joint, upper extremities	......	3	......	2	....	......	1	9	12
Fracture of clavicle	3	34	24	11	....	1	1	11	48
Fracture of scapula	......	1	......	1	....	......	....	4	5
Fracture of humerus	......	31	16	12	1	......	2	11	42
Fracture of bones of forearm—									
Radius	5	50	30	21	1	......	3	48	103
Ulna	2	21	10	10	3	......	....	9	32
Both bones	2	12	3	8	....	......	3	8	22
Fracture of carpus, metacarpus, or phalanges	4	53	25	24	3	......	5	93	150
Dislocation of clavicle	1	16	8	7	1	......	1	18	35
Dislocation of humerus	......	14	6	6	....	......	2	6	20
Dislocation of radius and ulna	1	4	1	3	....	......	1	1	6
Dislocation of phalanges of thumb	1	3	3	1	....	......	....	7	11
Dislocation of phalanges of fingers	......	2	......	2	....	......	....	2	4
Injury of bursa	......	1	......	1	....	......	....	3	4
Greenstick fracture of clavicle	......	....	......	....	....	......	....	1	1
Contusion of lower extremities	12	288	171	108	2	......	19	450	750
Sprain of hip	......	4	......	3	....	......	1	1	5
Sprain of knee	......	21	11	7	....	......	3	48	69
Sprain of ankle	7	121	77	34	3	......	14	169	297
Sprain of foot	1	4	1	4	....	......	....	17	22
Internal derangement of joints	......	....	......	....	....	......	....	1	1
Wound of lower extremities	8	222	143	77	3	2	5	549	779
Wound of joint, lower extremities	1	2	2	1	....	......	....	2	5
Fracture of femur	10	24	6	10	3	3	12	2	36
Fracture of patella	1	9	2	6	....	......	2	26	36
Fracture of tibia	4	34	23	7	1	......	7	5	43
Fracture of fibula	7	43	35	12	....	......	3	8	58
Fracture of tibia and fibula	5	49	23	17	....	1	13	10	64
Fracture of bones of foot—									
Of the tarsus	......	14	6	5	....	......	3	1	15
Of the metatarsus	4	51	23	30	....	......	2	19	74
Of the phalanges of the toes	......	11	5	5	....	......	1	9	20
Dislocation of patella	......	4	1	3	....	......	....	....	4
Dislocation of tibia	......	2	1	1	....	......	....	....	2
Dislocation of foot	1	4	2	2	....	......	1	....	5
Dislocation of metatarsus and phalanges	......	3	2	1	....	......	....	....	3
Dislocation of astragalus	......	1	1	....	....	......	....	....	1
Fracture of calcaneum	......	....	......	....	....	......	....	1	1
Miscellaneous	......	29	12	7	9	......	1	62	91
Autointoxication	......	9	5	4	....	......	....	33	42
Malingerers	......	7	5	....	2	......	....	18	25
Typhoid carrier	......	1	1	....	....	......	....	....	1
Undetermined	......	12	1	3	7	.....	1	11	23

TABLE 5.—*Comparative exhibit—Ratio of deaths from specific causes, 1907 to 1916.*

Deaths from—	General averag .	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
General disease	47.84	52.17	44.92	50.00	49.03	41.90	50.80	51.89	48.24	46.65	42.82
Disease of—											
Nervous system	6.15	6.72	5.06	6.51	3.67	5.18	8.50	6.75	6.39	6.78	5.90
Circulatory system	12.50	10.47	12.06	8.74	13.39	15.12	11.04	10.81	14.53	14.05	14.77
Respiratory system	11.62	11.06	13.42	9.87	13.60	14.90	10.35	10.27	9.25	12.26	11.18
Digestive system	6.41	5.34	4.67	10.08	7.13	5.83	6.44	5.13	5.28	7.89	6.33
Genito-urinary system	7.40	5.54	10.13	7.85	4.97	8.86	7.59	5.94	7.93	6.79	8.44
Injuries	6.45	7.12	7.20	5.61	7.34	6.26	4.37	8.01	5.52	4.16	8.88
From all other causes	1.63	1.58	2.54	1.34	.87	1.95	.91	1.20	2.86	1.42	1.68

TABLE 6.—*Surgical operations performed during the fiscal year 1916.*

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Abdominal adhesions	Laparotomy and adhesions broken up.	1	1		
Abdominal fistula	Incised and curetted	1	1		
Abscess:					
Abdomen	Incised and drained	7	7		
Arm	Incised and curetted	2	2		
Do	Incised and drained	7	7		
Do	Incised and scraped	2	2		
Do	Incised	2	2		
Appendicial	Incised and drained	2	2		
Axilla	do	8	8		
Back	do	4	4		
Do	Incised and curetted	1	1		
Do	Incised, curetted, and packed	1	1		
Breast	Incised and drained	1	1		
Buttock	do	2	2		
Chest	do	2	2		
Chin	do	1	1		
Dental periosteum	do	1	1		
Finger	do	4	4		
Foot	do	5	5		
Frontal sinus	do	1	1		
Hand	do	13	13		
Do	Incised	1	1		
Do	Incised and curetted	1	1		
Do	Incised, curetted, and drained	1	1		
Heel	Incised and curetted	1	1		
Do	Incised and drained	1	1		
Hepatic	Resection of rib and drain	2	2		
Ischiorectal	Incised and drained	13	13		
Do	Incised and curetted	3	3		
Do	Incised and packed	2	2		
Do	Incised, involving sphincter muscle	2	2		
Jaw	Incised and drained	4	4		
Knee	do	6	6		
Leg	do	2	2		
Leg and thigh	do	1	1		
Liver, amoebic	do	1	1		
Lung	Thoracectomy	1			1
Mastoid	Mastoid section and drain	1	1		
Mastoid, tubercular	do	1	1		
Neck	Incised, drained, and curetted	1	1		
Do	Incised and drained	9	9		
Over illium	do	1	1		
Perirectal	do	1	1		
Do	Incised and packed	1	1		
Perirectal and stricture of the urethra.	Incised, drained, and dilatation of stricture.	1	1		
Palm of hand	Incised and drained	3	3		
Penis	do	3	3		
Periproctitis	do	4	4		
Do	Incised, curetted, and packed	1	1		
Do	Incised	1	1		
Periurethral	Incised and drained	1	1		
Peritonsillar	Incised	4	4		

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Abscess—Continued.					
Perineal	Incised and curetted	1	1		
Do	Incised and drained	5	4		1
Peritoneum	Incised	1	1		
Prepatellar bursa	Incised and drained	1	1		
Prostate	do	3	3		
Psoas and Pott's disease	Aspirated and injection of formalin in glycerine.	1	1		
Psoas	Incised and drained	1	1		
Pubes	do	1	1		
Scalp	do	1	1		
Scrotum	do	3	3		
Submaxillary glands	do	1	1		
Testicle	Castration	1	1		
Thecal	Incised and drained	2	2		
Thigh	do	2	2		
Do	Incised and curetted	1	1		
Toe	do	1	1		
Do	Incised and drained	2	2		
Urethra	Incised	1	1		
Undefined	Incised and drained	1	1		
Adnoids	Excised	3	3		
Adhesion of tendons wrist	Freed by dissection	1	1		
Amputation toes, unhealed	Reamputated	1	1		
Amputation of finger, traumatic	Sutured	1	1		
Aneurysm of aorta, syphilitic	Injection neosalvarsan	1	1		
Ankylosis finger	Amputation	3	3		
Ankylosis toe	do	1	1		
Antityphoid prophylaxis	Injection antityphoid vaccine	664	664		
Appendicitis	Appendectomy	139	137		2
Bubo	Incised and curetted	10	10		
Do	Incised and drained	2	2		
Do	Incised	12	12		
Do	Excised	2	2		
Do	Incised and injection iodoform paste	1	1		
Bunion	Amputation	5	5		
Do	Incision of bursa	2	2		
Burn of leg	Skin graft, Thiersch's method	4	4		
Calculus in bladder	Superpubic cystotomy	1	1		
Calculus, undefined	Cystotomy, perineal	1			1
Carbuncle	Incised and drained	2	2		
Do	Incised and curetted	4	4		
Do	Incised and erosion	1	1		
Do	Incised	3	3		
Caries of alveolus	Incised and drained	1	1		
Caries of coccyx	Excised	1	1		
Caries of tympanum	Curetted	1	1		
Cataract, lenticular	Enucleation	2	2		
Cataract, undefined	Preparatory iridectomy	2	2		
Do	Capsulotomy	1	1		
Do	Excised	2	2		
Cerebrospinal meningitis	Spinal puncture	1	1		
Chancroid	Circumcision	11	11		
Do	Dorsal slit	1	1		
Cheloid	Plastic operation	1	1		
Do	Excision and suture	1	1		
Do	Excision	1	1		
Cholecystitis	Cholecystectomy and appendectomy	1	1		
Cholecystitis and appendicitis	Appendectomy and drainage of gall bladder.	1	1		
Condyloma of anus	Ligation and excision	1	1		
Condylomatus tissue	Thermocautery	1	1		
Contraction tendons, toe	Tendons lengthened	2	2		
Do	Tenotomy	1	1		
Do	Amputation	1	1		
Dacryocystitis	Dilatation lacrymal duct	3	3		
Deficient ala nasi	Rhinoplasty	1	1		
Deflected nasal septum	Submuscous resection	13	13		
Deformity of nose, old fracture	Refracture and straightening nasal bone.	1	1		
Deformity, toe	Amputation	3	3		
Dental necrosis	Extraction	1	1		
Diabetic gangrene of toe	Amputation	1	1		
Dislocation:					
Astragalus	Excision	1	1		
Cartilage of knee	Partial excision	1	1		
Clavicle	Reduction	1	1		
Humerus	do	4	4		

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Dislocation—Continued.					
Elbow	Reduction	2	2		
Semilunar cartilages	Incision and removal of cartilage	1		1	
Shoulder	Reduction	5	5		
Tibia and fracture of fibula	do	1	1		
Thumb	Plastic operation	1	1		
Ulna, elbow	Joint excised	1	1		
Wrist, compound, Com.	Reduction and suture	1	1		
Dropsy	Paracentesis	1	1		
Dysentery, amebic	Appendectomy	1	1		
Elongated prepuce	Cicumcision	2	2		
Empyema	Paracentesis	1	1		
Do	Thoracotomy	5	4	1	
Enlargement:					
Olecranon bursa	Excision of sac	3	3		
Tonsils and adenoids	Excision	1	1		
Tonsils	Tonsillectomy	3	3		
Turbinate bone and caries of septum.	Turbinectomy and subcutaneous resection of septum.	1			1
Epididymitis	Epididymectomy	4	4		
Do	Incised and drained	2	2		
Exostosis, metatarsal bone	Cuneiform osteotomy	1	1		
Fissure of anus	Incised and stretched	1	1		
Do	Divulsion	1	1		
Fistula in ano	Excision	10	10		
Do	Excision and drained	4	4		
Do	Excision and packed	1	1		
Do	Incised and curetted	12	12		
Do	Incised, curetted, and packed	13	13		
Do	Incised	2	1	1	
Do	Curetted and packed	1	1		
Do	Curetted and dissected	1	1		
Do	Repair of sphincter muscle	1	1		
Foreign body:					
Abdominal wall	Incised and extracted	1	1		
Arm	do	1	1		
Conjunctiva	Extracted	1	1		
Cornea	do	4	4		
Eye	do	1	1		
Eyelid	do	1	1		
Hand	do	3	3		
Knee joint	do	1	1		
Fractures:					
Arm	Reduced and fragments removed	1	1		
Cervical vertebra	Lamanotomy	1			1
Clavicle	Wired	1	1		
Do	Incised and part of bone removed	1			1
Do	Reduced and strapped	1	1		
Coccyx	Excised	1	1		
Femur	Reduced	3	3		
Do	Reduced and splint applied	1	1		
Do	Fragments replaced and plaster cast applied.	1	1		
Do	End removed and bone screw applied.	1	1		
Fibula	Reduced and splint applied	3	3		
Do	Reduced and sutured	1		1	
Do	Amputation	1			1
Finger	do	8	8		
Do	Reduced	3	3		
Forearm	do	1	1		
Hand	Amputation fingers	1	1		
Humerus	Lane's plate	1	1		
Do	Reduction and splint	1	1		
Do	Reduction and plaster cast	1	1		
Humerus, and injury to nerve.	Reduction and nerve sutured	1	1		
Leg	Incision and plate applied	1	1		
Do	Bone transplantation	1	1		
Do	Amputation	2		1	1
Metacarpus	Wired and bone splint	1		1	
Do	Sutured and drained	1	1		
Do	Excision of head of bone	1	1		
Do	Amputation	2	2		
Metatarsus	Reduction and splint	3	3		
Olecranon	Wired	1	1		
Patella	Sutured	3	3		
Do	Curetted	1	1		
Do	Wired	2	2		
Phalanx of toe	Excision of fragments	1	1		

Table 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Fractures—Continued.					
Radius	Reduction and splint	3	3		
Do	Reduction	2	2		
Do	Bone graft	1	1		
Radius and ulna	Reduction and splint	2	2		
Do	Reduction and plaster cast	1	1		
Rib	Reduction and splint	4	4		
Do	Reduction	1	1		
Scapula	do	1	1		
Skull	Trephining	2	2		
Submaxilla	Wired	4	4		
Tibia	Reduction and splint	2	1	1	
Do	Reduction and plaster cast	5	4	1	
Do	Lane's plate	2	2		
Do	Lane's plate and plaster cast	1	1		
Do	Bone graft	1			1
Tibia and fibula	Reduction and wired	2	1		1
Do	Reduction and splint	3	3		
Do	Plate and excision of bone	1	1		
Do	Reduction and plaster cast	5	5		
Do	Reduction bone graft and plate	1	1		
Do	Reduction and Lane's plate	2	1	1	
Tibia and fibula (ununited)	Reset	1	1		
Tibia and fibula	Bone graft	1	1		
Do	Amputation	1	1		
Do	Reduction	1	1		
Tibia and fibula (infected)	Drain	1			1
Tibia and fibula (old)	Plate removed	1	1		
Ulna, olecranon	Nailed	1	1		
Ulna (infected)	Incised and drained	1	1		
Ulna and radius	Albee bone inlay	1	1		
Do	Reduction and plaster cast	1	1		
Frostbite:					
Toes	Amputation	2	2		
Feet and hands	Amputation fingers and toes	2	2		
Furuncle	Incision	6	6		
Furunculosis, general	Incision and drain	2	2		
Gastric ulcer, perforating	Laparotomy, sutured and drained	1	1		
Gallstones	Removed and drained	1	1		
Ganglion of wrist	Excision	1	1		
Do	Incised and curetted	1		1	
Glaucoma	Double iridectomy	1	1		
Gangrene (old amputation)	Reamputation	1	1		
Gangrene of scrotum	Amputation and drain	1	1		
Gangrene of toe	Amputation	1	1		
Hammer toe	do	3	3		
Hematocele tunica vaginalis	Excision of tunica vaginalis	1	1		
Hemorrhoids	Clamp and cautery	30	30		
Do	Excision	36	36		
Do	Excised and packed	5	5		
Do	Ligation	3	3		
Do	Ligation and excision	33	33		
Do	Plastic operation	1	1		
Do	Stretching of sphincter muscle	1	1		
Do	Whitehead's operation	6	6		
Hernia:					
Femoral	Herniotomy	4	4		
Inguinal	Andrews	15	15		
Do	Bassini	289	289		
Do	Bates	2	2		
Do	Bloodgood	1	1		
Do	Bassini-Ferguson	1	1		
Do	Ferguson	45	45		
Do	Halstead	7	7		
Do	Herniotomy	59	59		
Congenital	Bassini	1	1		
Umbilical	Mayo	7	7		
Do	Herniotomy	2	2		
Unclassified	Bassini	3	3		
Do	Herniotomy	16	16		
Ventral	Mayo	2	2		
Do	Herniotomy	2	2		
Hydrocele	Aspiration	1	1		
Do	Bottle operation	15	15		
Do	Excision of sac	26	26		
Do	Tapping	6	6		
Do	Tapping and injection of iodine	2	2		
Do	Incision and injection of carbolic acid.	2	1	1	

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Hydrocele and cystic degeneration of testicle.	Orchidectomy and resection of cord and sac.	1	1		
Hydrothorax	Paracentesis	3		1	2
Hypertrophy prepuce	Amputation and suture	1	1		
Hypertrophy lymph glands	Excision	1	1		
Hypertrophy tonsils	Tonsillotomy	38	37	1	
Hypospadias	Radical cure	2	2		
Infected fracture ilium	Bone curetted	1	1		
Infected metacarpal bone	do	1	1		
Infected cervical glands	Incised and drained	1	1		
Inflammation of—					
Arm	do	2	2		
Bone, tibia	Incised and scraped	1	1		
Bursa, olecranon	Aspirated and iodine injected	1	1		
Do	Incised and drained	3	3		
Do	Aspirated	1	1		
Bursa, prepatellar	Aspirated and iodine injected	1	1		
Do	Aspirated	1	1		
Do	Incised and drained	2	2		
Bursa, undefined	do	1	1		
Ethmoidal and maxillary sinuses.	Turbinectomy, drain, and excision of necrosed bone.	1	1		
Femur	Bone curetted	1	1		
Finger	Incised and drained	2	2		
Foot	do	2	1		1
Do	Amputation	1			1
Frontal sinus	Excision part of middle turbinate bone.	1	1		
Do	Incision and drain	1	1		
Fallopian tube	Excision fallopian and ovary tubes	1	1		
Gall bladder	Cholecystostomy	3	1		2
Gall ducts	Gall bladder drained	1	1		
Glands, penis	Circumcision	4	4		
Hand	Incised and drained	6	6		
Inguinal glands	Excision	4	4		
Do	Incised and drained	1	1		
Joint, synovitis	Aspiration	1	1		
Knee	Incised and packed	1	1		
Do	Incised and drained	3	3		
Leg	do	2	2		
Liver	Exploratory laparotomy	1			1
Lymph glands—					
Axilla	Incised and drained	2	2		
Groin	Excision	49	49		
Do	Excision and drain	24	24		
Do	Incised, curetted, and packed	22	22		
Do	Incised and drained	117	117		
Do	Incised	8	8		
Do	Incised and curetted	7	7		
Do	Incised and packed	1	1		
Neck	Incised and drained	7	7		
Metatarsal bone	Curetted and excision of ends of bones.	1	1		
Neck	Incision and drain	4	4		
Scalp	Incised and drained	1	1		
Salivary and submaxillary glands.	do	1	1		
Sciatic nerve	Infiltration of salt solution and stretching of nerve.	1	1		
Testicle, orchitis	Castration	1	1		
Thigh	Incised and drained	1	1		
Thumb, abscess of back, and enteric fever.	Amputation of thumb and incision and drain of abscess.	1			1
Toe	Incised and drained	1	1		
Toenail	Plastic operation	1	1		
Tonsils	Tonsillectomy	18	18		
Undefined	Incised and drained	2	2		
Impacted serum in ear	Wax removed	2	2		
Intestinal obstruction	Laparotomy and release of adhesion	1			1
Intussusception and intestinal adhesion.	Laparotomy and breaking up of adhesions.	1	1		
Iridocyclitis	Iridocyclectomy	1	1		
Iritis, syphilitic	Injection neosalvarsan	1			1
Loss of skin due to infection	Skin graft, Thiersch's method	3	2	1	
Malaria fever	Injection of quinine	6	6		
Do	Injection neosalvarsan	1	1		
Mastoiditis	Incised and drained	2	2		
Movable kidney	Suture of capsule to lumbar aponeurosis.	1	1		

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Necrosis of—					
Bone, undefined	Incised and curetted	3	3		
Do	Incised, curetted, and packed	1	1		
Do	Amputation	1	1		
Femur	Incised and curetted	2	2		
Finger	Amputation	4	4		
Foot	Incised and curetted	1	1		
Jaw	do	2	2		
Phalanx of thumb	do	1	1		
Ulna	Excision of necrosed bone	2	2		
Neuralgia of genito-crual nerve	Resection of nerve	1	1		
Onychia	Excision of nail	4	4		
Orchitis	Incised and drained	1	1		
Do	Castration	1	1		
Osteitis femur	Incised and curetted	1	1		
Osteomyelitis of—					
Femur	Removal of sphacelus and drain	1	1		
Finger	Amputation	1	1		
Inferior maxilla	Incised and curetted	1	1		
Tibia	Chiseled, curetted, and drained	2	2		
Otitis media	Paracentesis and drained	2	2		
Painful amputated stump of finger	Reamputation	2	2		
Paralysis of musculo-spiral nerve	Scar dissected and nerve liberated	1	1		
Paraphimosis	Circumcision	9	9		
Do	Dorsal incision	6	6		
Periostitis—					
Femur	Incised and drained	1	1		
Tibia	Incised and curetted	1	1		
Undefined	Incised and drained	1	1		
Perforation of intestines, typhoid	Laparotomy and closure	2			2
Perforating duodenal ulcer	do	1	1		
Peritonitis	Laparotomy and drained	1	1		
Phimosis	Circumcision	152	152		
Do	Dorsal incision	41	41		
Phlebitis, penis	Incision and drained	1	1		
Plate and wired fracture of radius	Removed and packed	1	1		
Pleurisy with effusion	Paracentesis of pleural cavity	2	2		
Polypoid growth bladder	Removal of growth by suprapubic incision.	1	1		
Pyorrhea alveolaris	Extraction of teeth	1	1		
Psoriasis	Injection neosalvarsan	2	2		
Quinsy	Incision	1	1		
Raynaud's disease	Amputation of toes	1			1
Retention of urine	Suprapubic cystotomy	1	1		
Rupture of bladder	Laparotomy and drained	1	1		
Rupture of urethra	Incised and drained	1	1		
Septicemia of finger	Amputation	1	1		
Separation of cartilage of ear from bone.	Pinna satured	1	1		
Severed nerve	Neurorrhaphy	1	1		
Severed tendons	Sutured	1		1	
Sinus of thigh	Curetted and drained	1	1		
Sinus of groin	Incised and curetted	1	1		
Sinus of perineum	do	1	1		
Do	External urethrotomy	1	1		
Soft chancre of penis	Circumcision	2	2		
Do	Dorsal incision	1	1		
Do	Excised and curetted	3	3		
Spasm of anal muscles	Sphincter stretched	1	1		
Staphyloma	Excision	1	1		
Strabismus, divergent	Tenotomy and advancement	1	1		
Strabismus, convirgent	Tenotomy	1	1		
Stricture small intestine	Release of adhesions	1	1		
Stricture of rectum	Dilitation of rectum	1	1		
Stricture of urethra	Forcible dilitation	1	1		
Do	Gradual dilitation	28	28		
Do	External urethrotomy	8	8		
Do	Internal urethrotomy	7	7		
Do	External and internal urethrotomy	1	1		
Do	Meatotomy	4	4		
Synovitis knee joint	Aspiration and injection of formalin in glycerine.	1	1		
Do	Aspiration	1		1	
Syphilis	Injection neosalvarsan	162	161		1
Do	Injection of salvarsan	16	16		
Syphilis, cerebral	Injection neosalvarsan	1	1		
Syphilis, neuritis	do	3	3		
Syphilis, retinitis	do	1		1	

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Tabes dorsalis	Injection neosalvarsan	3	3		
Torsion of testicle	Castration	1	1		
Triple intussusception	Laparotomy, appendectomy, and reduction of intussusception.	1	1		
Tuberculosis of—					
Cervical glands	Excision	5	5		
Do	Incision	1	1		
Ankle	Amputation	1	1		
Epididymis	Incision and injection of silver nitrate.	1	1		
Do	Excision of spermatic cord	1	1		
Do	Orchidectomy	3	3		
Epididymis and vas deferens	Excision	2	2		
Hip	do	1	1		
Mastoid bone	Mastoid section and drained	4	4		
Prostate	Curetted	1	1		
Rib	Erasion and drained	1			1
Hip	Incised, curetted, and drained	1	1		
Spine	Cast applied	1	1		
Sternum	Erasion and drained	1			1
Testicle	Castration	11	11		
Do	Incised and drained	1	1		
Submaxillary glands	Excision	1	1		
Tumors:					
Cyst	do	7	7		
Carcinoma	do	1	1		
Do	Laparotomy, exploratory	1			1
Carcinoma of prostate	Superpubic cystotomy	1		1	
Carcinoma of pylorus	Post-gastroenterostomy	1	1		
Carcinoma of intestines	Exploratory laparotomy	1			1
Carcinoma of breast	Excision of breast, pectoral muscle, and axillary glands.	1	1		
Cyst of testicle	Aspirated	1	1		
Dermoid cyst	Excised and drained	2	2		
Dentigerous cyst of jaw	Incised and premolars removed	1	1		
Fibroma	Excised, curetted, and drained	1	1		
Do	Excised	1	1		
Hematoma	Punctured and aspirated	1	1		
Do	Incised and curetted	1	1		
Lipoma	Excision	10	10		
Myxoma	do	1	1		
Myeloid sarcoma	do	1	1		
Osteoma	do	1	1		
Papilloma of bladder	Destroyed by high-frequency current.	1	1		
Papilloma	Excision	3	3		
Pterygium	do	4	4		
Do	Inversion and sutured	2	2		
Sarcoma	Excision	1			1
Sebaceous cyst	do	22	22		
Squamous carcinoma	do	1	1		
Squamous epithelioma	Incised, curetted, and drained	1			1
Stye	Incision	1	1		
Tumor of pleura	Paracentesis of pleura	2		1	1
Undefined	Excision	19	19		
Ulcer:					
Anus	Cauterized	1	1		
Cornea	Excision of eyeball	1	1		
Foot	Skin graft	1	1		
Leg	do	5	5		
Do	Ligation of vein	1	1		
Rectum	Divulsion and packed	2	2		
Skin	Excised	1	1		
Stomach	Gastroenterostomy	1	1		
Do	Partial gastrectomy and partial gastroenterostomy.	1	1		
Undescended testicle	Excision	4	4		
Do	Mechanical implantation into scrotum.	3	3		
Urethral fistula	Edges freshened and sutured	2	2		
Vaccination against smallpox	Vaccination	21	21		
Varicocele	Excision	52	52		
Do	Ligation	4	4		
Do	Ligation and excision	45	45		
Varicose ulcer of leg	Excision of vein and scarification of ulcer.	2	2		
Varix of leg	Excision	58	58		
Do	Ligation	9	9		
Do	Ligation and excision	13	13		
Volvulus and intestinal perforation.	Laparotomy and perforations closed.	1			1

TABLE 6.—*Surgical operations performed during the fiscal year 1916*—Continued.

Operation for—	Character or name of operation.	Cases.	Result.		
			Successful.	Unsuccessful.	Died.
Volvulus	Laparotomy	1	1		
Whitlow	Amputation	1	1		
Do	Incised and drained	2	2		
Wound:					
Contused—					
Arm	Sutured and drained	1	1		
Elbow	Bursa aspirated	1	1		
Face	Disinfected and sutured	1	1		
Do	Sutured	1	1		
Finger	Amputation	9	9		
Foot	Incised and drained	1	1		
Forehead	Sutured	1	1		
Hand	do	1	1		
Do	Amputation	1	1		
Hip	Sutured and drained	1	1		
Scalp	Sutured	3	3		
Toe	Amputation	2	2		
Gunshot—					
Arm	Incised	1	1		
Elbow	do	1	1		
Finger	Bone fragments removed	1	1		
Foot	do	1	1		
Tibia and fibula	Ends freshened and skin graft	1	1		
Infected—					
Ankle	Incised and drained	1	1		
Finger	do	1	1		
Foot	do	4	4		
Do	Amputation of toes	1	1		
Do	Incised	1	1		
Forearm	Incised and drained	2	2		
Hand, fishhook	Excised and curetted	1	1		
Hand	Incised and drained	5	5		
Do	Incised and curetted	3	3		
Thumb	Incised and drained	1	1		
Lacerated—					
Arm	Sutured	1	1		
Eyelid	do	1	1		
Eyeball	Excision	1	1		
Face	Sutured	4	4		
Finger	Amputation	5	5		
Do	Incised and drained	1	1		
Do	Sutured	1	1		
Foot	Amputation of toes	1	1		
Forearm	Sutured and drained	1	1		
Hand	Sutured	1	1		
Do	Amputation	1	1		
Do	Tendons sutured	2	2		
Scalp	Sutured	1	1		
Stomach	Laparotomy	1	1		
Thumb	Amputation	2	2		
Do	Sutured and drained	1	1		
Throat	Sutured	1	1		
Toe	do	1	1		
Punctured—					
Foot	Tetanus antitoxin administered	1	1		
Do	Incised and drained	2	2		
Hand	Foreign body removed	1	1		
Knee	do	1	1		
Undefined	Amputation	11	11		
Do	Repaired	20	20		
Total		3,336	3,282	19	35

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